An authoring view of education through the exploration of conceptions of nature

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through the Exploration of Conceptions of Nature

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Signature 

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Abstract

One of the significant tasks of education is to enable one to learn to live a meaningful life. It will be argued that "nature" is a rich and fundamental source of meaning in this respect and yet that what is taught about nature in many conventional curricula is severely limited, resulting in an impoverishment of meaning. The central aim of this thesis is to identify and elucidate meanings of nature that have rich educational significance and to begin to explore their implications for pedagogy.

The investigation consists in three broad parts. The first is an analysis of a current set of curriculum guidelines in order to reveal some underlying ways in which limited understandings of nature are represented and promulgated. The Taiwanese *Grade 1-9 Curriculum Guidelines* is taken to exemplify this, and also the way in which global educational reform has resulted in the incorporation of a modern "Western" view of nature that is defective in two key respects: an underlying "homogenisation" and an underlying "disembodiment" in our understanding. It is argued that these result in the oversimplification of the content and process of learning with regard to nature.

In order to extricate our learning from the pitfall of oversimplification by inviting a richer experience of nature, this thesis explores our conceptions of nature. Five themes are identified to anchor the numerous, various, and complex conceptions of nature. Each theme with its implying polarities illuminates the significance of the human conceptualisation of nature as an on-going dynamic and dialectic process. It will be argued that the investigations invite us to reconfigure the curriculum so as to accommodate heterogeneous and plural views of nature and reveal the abundance of meaning to be had in different ways of experiencing nature in the context of one's unique life.

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PART I

Nature and Education

Humanity follows the Earth; Earth, Heaven; Heaven, Tao and Tao, Nature.

(Lao Tsu, Dao Te King)[1]

Nature speaks with a thousand voices, and we have only begun to listen.

(Prigogine & Stengers, 1985, p.77)

[1] There are numerous English versions of *Dao Te King (Tao Te Ching)*. The version cited here is adopted from a German website "Das Tao Te King von Lao Tzi", cataloging 128 versions of 24 languages. Among them are 84 English versions. After comparison of these translations one by one, the citation of chapter XXV is from Cheng's due to the succinctness and faithfulness, in the author's personal view.

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Introduction:
Nature as an Issue for Meaningful Education

One of the significant tasks of education is to enable one to learn to live a meaningful life. But what is a meaningful life? What is the meaning of *my* life? This is a question which has kept haunting human mind for millennia. The most important motif for many philosophers' pursuits, implicitly or explicitly, is to seek the meaning or meanings or the most important or valuable things in life (Metz, 2007). A meaningful life for one can thus be understood as a life in which one can experience the most important things for one's life. Paradoxically, the meaningfulness does not lie in the sheer possession of the important things but in the relationships between subjects and objects. For example, stamps could be the most important things for a stamp collector. Yet what makes a stamp collector's life meaningful is not only the sheer possession of the stamps themselves but also the experiences associated with the stamps, such as memories, psychological satisfactions, feelings and knowledge and, the sheer fascination and joy (sometimes mixed with frustrations) of the activity itself. Something in experience that is conveyed and connoted makes this stamp or these stamps important and thereby makes the collector's life directional, interesting and meaningful.

Thus the concept "meaning" in this thesis is not used in a strict linguistic sense to mean denotations but in a broad sense to denote something that is signified, conveyed, connoted in and related to experience. "A "meaningful" object", tangible or

intangible, means that this object can remind one of one's life experiences and inspire many or rich meanings and abundant significance. In other words, a meaningful object is an object full of meanings; it can help one to apprehend many meanings from this moment of experience. It can illuminate plentiful relationships with many other objects. An object with rich meanings can inspire diverse and multiple experiences. In contrast, a "meaningless" object with poor meaning and meagre significance is in weak or thin relationships with other objects. Therefore, a meaningful life is a life full of meanings --- a living process within which diverse, different, interesting and fruitful experiences are activated, connected or related and refreshed through various and continuous relationships and interconnections.

A meaningful education is an educational process which can improve a meaningful or meaning-full life; to unpick that, this process can be enhanced by "right" people and "appropriate" materials which can help learners to understand the multiplicity of the relationships interwoven within the very moment of learning. This view of education can be understood to some extent in terms of the deep approach to learning proposed by Marton and Säljö (1984). A deep approach to learning is that the learners engage with the materials in an active and reflective attitude and acquire fertile meanings from them, while learners in a surface approach lack such a probing, caring, actively exploring attitude and fail to gain rich meanings during the process (Marton & Säljö, 1984). Overall, whether an education is rich or poor in meaning consists in the interrelationships between subjects and objects, learning approaches and materials, or pedagogical methods and curricula.

In this respect, the concept "nature" might be one of the richest and the most fundamental sources of meaning and inspiration; it has been and still is one of the most important themes concerning human beings through history, and across cultures. However, a single set or sets of unified definitions of nature cannot be specified without debate. Drawing on Merleau-Ponty (2003): "There is nature wherever there is a life that has meaning… Nature is what has a meaning…Yet nature is different from man: it is not instituted by him…" Life that has meaning is nature or a part of nature, thus nature has meaning. Yet the meaning of nature is not something to be discovered insofar as life is a process and so is nature. The meaning of nature is revealed during the interaction between human beings and nature. With regard to nature and human

beings, we may also say that, there is nature wherever and whenever there is humanity. "Nature", as a source of life, meaning and inspiration, should be thus taken as an important issue in education. This point invites us to think about whether current educational practices pay adequate heed to the concept of nature.

It seems difficult to find in educational discourse adequate and sufficient discussions distinctively focusing on the concept of nature. On the one hand, the educational discourse which highlights this term is often limited to the fields of environmental education (EE) and science education (SE) (Bonnett, 2007). One of the ways of revealing whether our present educational practices pay adequate attention to "nature" could be the analysis and examination of the curriculum related to EE and SE. On the other hand, the concept of nature has great influence on human understanding related to epistemology, metaphysics, theology, aesthetics, ethics, worldview, etc. The concept of "nature" has been embraced in the assumptions about "human nature", "natural environment", "natural law", "the wild" and "the quality opposite to 'man-made' or 'artificial'" by general educational literature. This point shows that the meaning of nature could be far wider and richer than we learn in EE or SE. The general discourses about nature might provide us with inspiration to reconsider the meaning of nature with respect to education and to enrich education and life.

The above thoughts point out two tasks ahead: the revealing of the meaning of nature conceived in current educational practices such as curriculum and exploration of the meaning of nature in more general and broader varieties of discourse. The first task will demonstrate the shortcomings and lead on to the following exploration to identify the causes of the shortcomings and seek ways of overcoming the problems.

Let me give a brief explanation of the two tasks. The first task is to examine the meaning of the conception of nature in current educational practices to reveal whether those practices provide learners with a curriculum which is beneficial for developing a meaningful life by, or through its conception of nature. Here I may take the Taiwanese *Grade 1-9 Curriculum Guidelines* as an example for discussion. Two central points causing the oversimplification of the conception of nature implied in the curriculum can be identified: "homogenisation" and "disembodiment". The elucidation of the sense of nature in the curriculum is undertaken in the hope that the

curriculum can be made more helpful for us to learn to live a richer life. This task will be undertaken in Chapter 2.

The second task can be understood as the main exploration of this thesis which will be carried out from Chapters 3 to 7. In order to make our understanding, learning and living more meaningful, we are brought to enquiries concerning nature: What kinds of concept of nature would be helpful to enrich our education and thus be referred to in curricula? What kinds of learning process relating to such conceptualisations might prove more meaningful and insightful?

As mentioned, the concept of nature may be used in the assumptions about "human nature", "natural environment" and many other ideas without being highlighted. It might be difficult to find a "best" way to encompass "all" the meaning of nature. But if appropriate orientations to a more meaningful conception or conceptions of nature can be identified, they may enrich education and life by being included in curricula.

In order to identify the appropriate orientation, some introduction of past studies may help. Enquiry into conceptions of nature and education may be divided into two types: education-based and nature-as-key-concept-based. Works based on these two types of enquiry are not exclusively separated from each other.

1) education-based

The first type of enquiry can be understood as education-based. The concept of nature is as an assumption for supporting certain educational ideas or practices. The importance of nature is apparent in the following three educational fields. They are naturalistic education, natural science education, and environmental education. The concept of nature is an indispensible idea underpinning these educational fields but not in the same sense. Its meaning varies in different fields. Let us have a brief overview.

Naturalistic education is often connected with child-centred education. The most well-known figure could be Rousseau (1962). Many authors (Allen, 1937; Attfield, 2004; Harrison, 1992) point out that there may be contradictions in Rousseau's thought of nature and education; however, his view that "the inner development of our faculties and organs is the education of nature"

(Rousseau, 1962) has great influence on today's child-centred education (Oelkers, 2002). Another important source nourishing child-centred and naturalistic education is Romanticism. Many authors (Halpin, 2006) point out that Romanticism values love, imagination and human potential. Romantics believe that there is consonance between human nature and nature and therefore nature is helpful for human learning. In this light, "nature study" and "outdoor education" are regarded as important educational means (Postma, 2004; Stevenson, 2007).

As for natural science education, its focus is learning about natural phenomena and natural law. In some respects, it can be taken as an ancient discipline. The ancient study of nature includes the studies of cosmos, universe, world, and supernatural deity (R. G. Collingwood, 1945; F. J. Collingwood, 1960; Copleston, 1966a). The function of ancient legends and myths, in the sense of providing explanations of nature, is similar to that of modern scientific theories although they are taken as different kinds of knowledge nowadays. At the present time, cosmology and theology are no longer taken as parts of natural science study. Yet the concept of nature still underpins these studies even though they are understood as very different disciplines in modern people's eyes. It is interesting to explore the turning point or the driving force of the split of these studies and the meaning of nature assumed in these studies.

Compared with the above, environmental education can be taken as a newly emerging subject. Its development is related to the increasing problems and growing concern about our environment. At the initiative stage, environmental education, in some respects, can be taken as a continuation of outdoor education and nature study, aiming to raise appreciation and love of nature (Postma, 2004; Stevenson, 2007). With the escalation of environmental problems, the scope of environmental education is broadened to include social, political, economic and ethical issues. This highlights the ethical aspect of the human/nature relationship and the importance of interrogating the ethical meaning of the idea of nature. Environmental ethics is thus one of the foci in contemporary environmental as well as philosophical discourses.

There have been innumerable works concentrating on environmental ethics in recent decades (Attfield, 1983; Leopold, 1949; Light, 2000; Light & Rolston III, 2003; Nash, 1985; Oelschlaeger, 1996; Rolston III, 1989a, 1989b; Weston, 1996). The relationship between human and nature is highlighted and under examination. Most of the authors attempt to articulate the human/nature relationship in a normative language.

Overall, the concept of nature plays a crucial role in these educational fields. It does not mean that there is clear understanding of the concept of nature. On the contrary, the number of debates on the concept of nature is increasing with growing environmental awareness and educational reflection. For example, what is the definition of "nature" in the conservation movement? Is it required for an educator to be environmentally aware? Is it the same with that in naturalistic education? What is the relationship between human and nature from different perspectives, such as a naturalist view, scientist view, or Romantic view? Does an environmental educator understand "nature" in the way of an environmentalist? What is meant or implied by "education for nature" or "education for environment"? There can be more questions about "nature" and "education" and they are difficult to answer in short paragraphs. However, what we can find here is that many educational theories and practices all assume "nature", yet, in very different ways of understanding. Are those assumed conceptions of nature all helpful for a meaningful education and life? What kind of conception or conceptions of nature could be mostly educationally meaningful? Thus more clarification and discussion of the concept of nature may help for contriving educational ideas and practices related to nature. This is related to our second type of enquiry into nature.

2) nature-as-key-concept-based

The second type of enquiry concerning the concept of nature in relation to education can be understood as key-concept-based and may be pursued out of educational fields, such as through history, social studies and philosophy. Authors of this kind of work aim at exploring the meaning of nature in different respects. They may or may not develop and interpret educational implications

from their work. However, whether they concern themselves directly with education or not, educators or philosophers of education can still find inspirations from works of this sort.

There are numerous works investigating the meaning of nature from different perspectives, such as topic, issue, thinker, school of thought, culture, region and timeline. For example, some works focus on a certain topic. For instance, "nature" or "naturalness" is a key concept of the ancient Chinese classic *Lao Tzu* (or *Dao Te King*) authored by Lao Tzu (Liu, 1998). *Lao Tzu* is well-known as a cornerstone of Taoist philosophy and religion in Chinese culture. The meaning of its core concept "Dao" (or "Tao") is multivocal, contentious and inspiring. However, many scholars admit that the most important meaning of the idea of Dao could be "nature" or "naturalness" (Liu, 1998). As the concept of nature has many references including physical world, nonhuman beings, natural law, particular properties of things, or forces controlling events in physical world in Western context, the term Dao also refers to many meanings, such as spontaneous state of all beings, supernatural deity, truth that is spoken, the act of speaking, logos, essence, universe, and path (or "way"). Among such many meanings, the concept of Dao as nature is mostly often used to describe the natural state of all beings. Since Dao is the ultimate truth of universe, the best way of life is to follow it, to live in accordance with its, or our own, natural state. Living in accordance with Dao (or nature) is not equivalent with living by instinct. According to Lao Tzu, natural state is a state of being harmonious with nature. In many respects, it is difficult for readers to acquire a clear and distinct definition of nature in *Lao Tzu*. On the one hand, *Lao Tzu* is written in a very laconic and archaic literary form. On the other hand, the author Lao Tzu describes Dao as ineffable, unnamable, and invisible: "If Tao can (be) Tao(ed) (expressed in words), then it's not always Tao" (Lusthaus, 1990, p. 192).[2] Thus, the idea of Dao surpasses human comprehension and cannot be expressed in human language. It is interesting to find that the

[2] This sentence "If Tao can (be) Taoe(ed), then it's not always Tao" is adopted from Dan Lusthaus' very apt translation. "Tao" can be understood as "path" (or "way") "speech" and "act of speaking". Thus this sentence is more often translated as follows: "The truth which can be spoken is not the constant truth." and "The way which can be trodden is not the enduring and unchanging way".

meanings of the concept of Dao in Chinese context may be as complex and plural as those of the concept of nature in a Western context.

Take another example. “Wilderness” is a key concept in Oelschlaeger’s enquiry into nature (1995). Oelschlaeger adopts a historical and key-concept approach to the investigation of the meaning of “wilderness” from Paleolithic to postmodern times. There are works focusing on special issues, such as “ecofeminism”, “sustainable development” or “sustainability” (Bonnett, 1999, 2002a, 2002b, 2003, 2004, 2007; Stables, 1996, 2001). In the view of ecofeminists (Kheel, 1995; Merchant, 1983, 1992, 1995; Plumwood, 1993; Warren, 1995), one main theoretical cause responsible for environmental problems is human mastery over nature. This mastery is asserted by ecofeminists to be in tune with masculine oppression of women and with other forms of oppression. Ecofeminists believe that the liberation of women is helpful to some extent for enhancing human exploitation of nature. As for “sustainable development”, it is an issue in debate (Stevenson, 2006). It was formally proposed in the United Nations report *Our Common Future* (WCED, 1987) as a certain solution to the dilemma of improving environmental problems and meeting economic needs. For policy-makers, it could provide a “common language” (Postma, 2004) for compromising expectations of environmental improvement and economic growth. However, it is criticised by many as an oxymoron (Bonnett, 1999) or a “paradoxical compound policy slogan” (Stables, 1996). Thus, some authors suggest a reconceptualisation of the idea of sustainability, for example, as a frame of mind rather than a policy (Bonnett, 2002). This could be more educational.

There are some works aiming at exploring the meaning of nature in the view of particular thinkers. For example, many authors find an inspiration from Martin Heidegger’s thought for developing environmental philosophy (Bonnett, 2003; Zimmerman, 1983, 1986, 1993, 1994). Heidegger’s (1962, 1977) critique of technology and modernity perceptively reveals the dangers implied in modernism towards environment and human existence. According to Heidegger (1977), modern technology is characterised by the feature of “Enframe” (*Gestell*), meaning “revealing” (or *alethia*), “setting-upon”, “challenging forth”,

"producing", "presenting", "unconcealment", "occasioning", "bringing forth", and "destining". Technology expands human exploitation of nature and, paradoxically, confines human freedom by leading humans to forget about their own being --- *Dasein*. On this point, we may understand why Zimmerman (1986) relates Heidegger's philosophy to deep ecology --- both criticise modernist thinking and lifestyle. Arne Naess's (1989) --- one founder of deep ecology --- critique of modern technology and modern lifestyle in his *Ecology, community and lifestyle* is in tune with Heidegger's. Heidegger's strategy of dealing with the forgetting is a call for returning to "Being" or "Sein". In my point of view, the Heideggerian approach seems mystical and essentialist in attitude. According to Heidegger, "man finds himself in Being and does not create it, nevertheless Being is not properly grasped by the categories of Nature. For Nature, which Heidegger likes to call *das Vorhandene*, is also only a part of Being, something within the whole or in Being" (Gray, 1952, p. 416). This is confusing: is Being supernatural? Yet Being is neither nature nor God; moreover, Being cannot be grasped "through the being or in the beings --- or anywhere else" (Heidegger, 1961, p. 27). Being is beyond humans and ineffable. In short, Being is nothing that can be understood through language. Heidegger always describes Being as "self-revealing", "self-disclosing" and paradoxically "self-concealing". However, what interests me is the answer to the question: what does Being conceal or reveal? As Heidegger (1998, p. 252) states, "Yet being – what is being? It 'is' It itself. … Being is essentially farther than all beings and is yet nearer to the human being than every being, be it a rock, a beast, a work of art, a machine, be it an angel or God". He seems to say that there is no answer to what Being is or is not. In brief, although Heidegger provides inspirations for criticising modernity and technology and for developing environmental reflections, his idea of "Being" is puzzling for readers.

On this path of existential phenomenology, French philosopher Maurice Merleau-Ponty may be helpful for overcoming the tendency of mysticism and essentialism when conducting phenomenological interrogation of the concept of nature in relation to education. His ideas of perception, bodily experience and

nature[3] and the potential for environmental philosophy have started attracting scholars' attention lately (Abram, 1995, 1996; Cataldi & Hamrick, 2007; Hung, 2008). Merleau-Ponty's philosophy could be inspiring for reconsidering the meaning of lived experience and lifeworld in relation to nature (Hung & Stables, 2008; Van Koppen, 2000; Van Manen, 1997). What kind of lived experience can we have in nature? If nature can be helpful to enrich human lived experience or lifeworld, it could be treated with more attention and care. This could be a turning point for conceiving an education which can be friendly to nature.

Moreover, some authors explore the meaning of nature from the perspectives of certain schools of thought, such as "Romanticism" (Garrard, 1998) or "deep ecology" (Naess, 1989, 2005). These explorations give us different inspirations for conceiving of nature and the human/nature relationship. For example, according to Garrard (1998), the most distinguishing point of Romantics is their belief in the intrinsic value of nature. This seems to be in tune with critiques of anthropocentrism which is criticised by many as one main theoretical cause of environmental problems. None the less, Romantics highly value individual freedom and autonomy. Then, how does a Romantic view cherish human individuality and disapprove of anthropocentrism simultaneously? What is meant by the Romantic value of nature? What is implied in the concept of anthropocentrism? An enquiry into the Romantic view of nature and humanity may be helpful for the exploration of the meanings of nature.

One point is common, explicitly or implicitly, for most of the above discussions: a critique of modern technology. Modern technology is identified by many as a crucial factor resulting in today's environmental problems in practice. However, what concerns philosophers more is the underpinning of modernist instrumental rationality which is regarded as a theoretical root of human crisis (Habermas, 1971, 1996; Husserl, 1970). For example, according to Habermas (1971), the production of knowledge and science is related to human

[3] Merleau-Ponty did not publish works about the concept of nature; however, he still showed much interest on this topic. During the years 1956 to 1960, he gave courses focusing on the idea of nature at the Collège de France. The courses notes on nature were collected and published after his death, under the title *La Nature*. The English version was published in 2003.

interests. There are three types of human interest and rationality: technical, practical and emancipatory. Correspondingly, these three types of rationality provide legitimation for three different domains of science including natural science, interpretive science and critical science (Carr & Kemmis, 1986). The problem caused by modernism is an unbalanced over-expansion of technical interest, or instrumental rationality. Instrumental rationality denotes "manipulation and control of the environment; prediction about observable physical or social events; reality, based on empirical knowledge and governed by technical rules; and the criteria of effective control of reality, which determines the appropriateness of action" (Merzirow, 1981, p. 4; cited in Ewert, 1991). This instrumental rationality pervades all domains of knowledge and results in a crisis in our lifeworld since all levels of human life are measured, understood and practised according to the same technical criteria. Habermas' critique, in tune with Husserl's, pertinently describes the pervasiveness of the modernist instrumental, materialist rationality and its edging out of other types of rationality. This may result in the impoverishment of meaning in, for instance, imaginative life and is thus worth notice: how then does the modernist instrumental rationality become so pervasive and dominant? How does it influence our understanding of nature and education? Overall, although Habermas' critique of modernist instrumental rationality is revealing, it is questionable whether human interest and rationality can be distinctively separated into "only" three types and fit in three domains of knowledge. In my view, this classification could also over-simplify our understanding of nature if these three types of interests and knowledge are taken as the only effective orientations. The Habermasian position seems, in some respects, to rule out the significance of affectivity and imagination in life and in education. These are cherished by Romantics.

In addition, some works focus on the concept of nature in respect of the relationship between environmental change and religion. For instance, Lynn White (1967) identifies Christianity as one of the roots of today's environmental problems. Some authors explore the concept of nature from particular cultures, traditions; or geographical areas or regions (Corbeil, 2003; Soper, 1995, 1996;

Weller, 2006). For example, Robert Weller (2006) has documented the transformation of meaning of the concept of nature in Taiwan and in China. He points out that the understanding of nature in modern Chinese tradition has been heavily westernised due to the influence of globalisation although the understanding of nature before it was influenced by Western ideas in the 19th and early 20th century was generally used to denote various ways of thinking about the environment and how people should live in it. Weller's finding may help this thesis to contextualise the exploration of the meaning of nature in the western tradition.

Among these many perspectives, works studying nature chronologically can exhibit more detailed and comprehensive meanings of nature in different periods of time. Let us have a more detailed discussion. For example, *Man and Nature* authored by George Perkins Marsh (1874) might be seen as an early and significant work revealing how human beings change the natural landscape and the implied cultural and social factors. Clarence J. Glacken's (1967) *Traces on the Rhodian Shore* is one of the classics for its detailed expositions of the development of natural environment. Its subtitle manifests the main target of this work: *Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century*. There are three main ideas as the axes of this book: the idea of the Earth designed for man, the idea of environmental influences, and the idea of humankind as a geographical agent. However, these two books make elaborate investigation of the relationship between human action and environmental changes and the implied social, cultural and intellectual factors. Yet there are still limits when we attempt to retrieve meanings of nature from the above works to enhance curriculum: firstly, by focusing on the physical environmental changes and the related human action, the works above read as encyclopaedias of history of geography rather than exploration of the meaning of the concept of nature. Moreover, there is a difficulty caused by the study of environmental history itself. As an interdisciplinary field, environmental history may not be specified by a clear definition because there are innumerable materials and data coming from other fields such as agriculture, geography, natural sciences, and so on.

Peter Coates in his *Nature: Western Attitudes since Ancient Times* (1998) explores "historical nature" from ancient times to the modern era. Attempting to outline the major categories of the meanings of nature in the Western context, he provides five categories: nature as a physical place; nature as collective phenomena of the world; nature as an essence, quality and/or principle; nature as an inspiration, guide, and source of authority governing human affairs; and nature as the conceptual opposite of (artificial) culture (Coates, 1998, p. 3). Coates, on the one hand, perceptively reveals the complexity and ambiguity of the idea of nature and its inconsistency with environmental actions throughout history; on the other hand, his elucidation of the varied meanings of nature may be somewhat insufficient because he fails to provide further claims and implications for practices --- whether on an ethical or political level. Moreover, one point that might need notice is that his discussion related to the "postmodern" is relatively scant. As the author promises, this work aims at displaying Western attitudes towards nature since ancient times, the discussion of the "postmodern nature" is comparatively slight --- only three pages in the last chapter --- although the term "postmodern" is defined as a period of time after modern times or a certain cultural, social and philosophical ethos or characteristics distinguishable from those of modernity.

Compared with Coates's work, Bruce Morito's *Thinking Ecologically: Environmental Thought, Values and Policy* (2002) investigates the concept of nature from many aspects, incorporating a historical approach and discussion of values, ethics, policy and sustainable development. The meaning of nature is divided into three kinds of world view according to three periods of time: animism in classic times, mechanism in modern times, and ecological thinking after the rise of evolutionary and ecological theories. Morito strives to present a world view adopting ecological process as the context of thinking, viz. "thinking ecologically". In order to attain this world view as "thinking ecologically", the "understanding of the history of ideas…began to appear…as a path to greater inclusion of perspectives, as shifts in world view seemed to undermine former world views, while building on them" (Morito, 2002, p. 2). Some part of this paragraph is acceptable and some debatable. The emergence

of a world view is very possibly established on the ground of the former world views but not necessarily based on the destruction of the former views. It might be an extension or refinement. In addition, Morito's perspective seems to take the development of world views as a linear progress along history. In this sense, the world view is taken as a unitary view and the implied complexity, plurality and ambiguity of nature could be overlooked.

In addition to the historical approach, there are other different approaches to the understanding of nature by taking particular theoretical perspectives. Many contemporary reconsiderations of the idea of nature can be understood as reactions to modernism. Modernism is generally recognised as one of the important causes of environmental crisis; accordingly, many doctrines or ideas contra modernism have been proposed as antidotes, including non-Western, non-modern, traditional or postmodern ways of thinking. For example, Neil Evernden (1992), David R. Griffin (1988a, 1988b, 1988c, 2000), Max Oelschaeger (1991), Richard Rorty (1980) and many other authors have made in-depth investigation of the concept of nature although their thoughts concerning the issue of nature and approaches are quite different.

As postmodern responses to modernism, these authors' thoughts may be briefly divided into two categories --- adapted from Griffin's (1988a, 1988b, 2000) view: deconstructive and constructive postmodernism (Hung, 2007). Put simply, deconstructive postmodernism can be characterised by the features of anti-essentialism and anti-foundationalism by revealing that the taken-for-granted and everlasting ideas, values, beliefs and truths ("eternal verities and orthodoxies") are socially and culturally linguistic constructs and so no more transcendental and perennial reality "foundations" can be found "out there". Jacques Derrida is taken as one of the leading "deconstructive" thinkers. Viewed in this light, "nature" is a social construction whose meaning depends on the context. Adopting this approach, some authors announce the end of "nature" such as Michael E. Soulé and Gary Lease (1995), and William Cronon. Michael E. Soulé and Gary Lease, as editors of *Reinventing Nature: Responses to Postmodern Deconstruction*, state in the *Preface* that "The so-called deconstructionist view…asserts that all we can ever perceive about the world

are shadows, and that we can never escape our particular biases and fixed historical-cultural positions" (1995, p. xv). Moreover, Cronon argues that the concept of nature as wilderness is a myth, a hope, and a quasi-religious value:

> *…wilderness is not quite what it seems…it is quite profoundly a human creation --- indeed, the creation of very particular human cultures at very particular moments in human history… we too easily imagine that what we behold is Nature when in fact we see the reflection of our own unexamined longings and desires. (Cronon, 1996, p. 7)*

Soulé and Lease and the other authors in the anthology and Cronon have invited the criticism of various authors including Samuel P. Hays (1996), Michael P. Cohen (1996), Thomas R. Dunlap (1996) and George Sessions (1995). Some authors (Griffin, 1988a, 1988b, 1990) claim that one of the views opposed to deconstructive postmodernism is constructive postmodernism. Although I doubt whether it is appropriate to name "constructive postmodernism" as one branch of postmodernism, this point will be argued in later chapters. Now let us return to the so-called "constructive postmodernism".

According to Griffin (1988a, 1988b, 1988c), deconstructive postmodernism is unable to ameliorate modern predicaments such as the environmental crisis; furthermore, deconstructive postmodernism and its implied relativism and nihilism aggravate the problem. Griffin (1988c) claims that deconstructive postmodernism overcomes the modern worldview through an "anti-worldview view". "The ingredients necessary for a worldview, such as God, self, purpose, meaning, a real world, and truth as correspondence" (Griffin, 1988c, p. x) are eliminated by deconstruction. This criticism could be questioned because Griffin seems to confuse deconstruction of the unchangeable, transcendental reality of ideas with that of conceptualisation of ideas and with relativisation and nihilisation of the world. However, in Griffin's view, what is needed is "constructive postmodernism". It involves "a new unity of scientific, ethical, aesthetic, and religious intuitions…Constructive

postmodern thought provides support for the ecology, peace, feminist and other emancipatory movements of our time" (Griffin, 1988a, p. 2-3). This perspective can be understood as containing numerous *re*-workings of nature, including *re*-invention, *re*-construction, *re*-creation, *re*-description, *re*-contextualisation, *re*-divinisatrion and *re*-enchantment. Paradoxically, constructive postmodernism on this point seems to adopt the idea of its enemy, deconstructive postmodernism, because the reworking implies dismantlement and dissection of the old structures and the following building and composition of new ones. According to Griffin's view, what distinguishes constructive from deconstructive postmodernism may be the features of *re*-divinisation and *re*-enchantment of nature.

However, it is not clear how best to use the term "constructive postmodernism", because postmodernism is a term in a very broad sense which refers to a wide range of positions including deconstruction, nihilism, relativism, anti-foundationalism and anti-essentialism. In my understanding, what Griffin considers as deconstructive postmodernism refers to relativism and nihilism; while what he takes as constructive postmodernism is a certain kind neo-eco-theology which integrates Whitehead's process philosophy, ecological thinking, parapsychology and religion [4]. I disagree with Griffin's definition of postmodernism. On this point, many prominent thinkers, such as Friedrich Nietzsche, Richard Rorty, Jacques Derrida, may give us more food for postmodern thought.

[4] Griffin's constructive postmodernism in some respects can be understood as an assemblage of anti-modern notions. He sees modern world in crisis and thus the modern world view needs to be transcended. The problem of modernism can be overcome by constructive postmodernism. In Griffin's view, the modern world view is characterised by individualism, anthropocentrism, patriarchy, mechnisation, economism, nationalism, secularism, and militarism, while constructive postmodernism is composed of various and divergent thoughts including "ecology, peace, feminist, and other emancipatory movements" and "premodern notions of a divine reality, cosmic meaning, and an enchanted nature". Moreover, he claims that "through its [constructive postmodernism] return to organicism and its acceptance of nonsensory perception, it opens itself to the recovery of truths and values from various forms of premodern thought and practice that had been dogmatically rejected by modernity" (Griffin, 1988c, p. xi). In some sense, this constructive postmodernism seems a farrago of anti-modern ideas. The modern worldview, according to Griffin (1988a, 1998b, 1988c), contains the notions of atheism, mechanism, materialism, militarism, environmental crisis and disenchantment and thereby the countering ideas are the solution. These ideas, such as theism, organcism, spirit, peace, ecology and enchantment, compose constructive postmodernism. Such pursuit of solution to the modern problem seems a wishful thinking.

For instance, Rorty (1993a) points out that the process of making distinctions, redescribing and recontextualising consists of two parts: to "criticise" present practices by "exposing" and "demystifying" them and to "suggest" alternative ones. In sum, deconstruction can be understood as denoting an on-going process of continuous re-examining, questioning, dissolving, decomposing, re-inventing and re-composing. Therefore, the notion of deconstruction refers to the ideas of dismantlement and dissection of the old structures and the subsequent building and composition of new ones. Yet this will not be explored in-depth in this paragraph. The aim here is only to introduce the variety of "postmodern" approaches to nature.

The above constructive postmodern view is, to some extent, in tune with the view of Oelschlaeger (1991) who understands postmodernism in terms of "cosmic synergism" and some other authors who do not label themselves as postmodernists, yet view things in a similar light, such as Patrick Curry (2003, 2007), who argues for "eco-pluralism" (or can be termed "ecological pluralism or "pluralist ecocentrism"). There is a tendency in these views, which is an attempt to pursue the sacredness or divinity of nature. Yet, this pursuit could be at the risk of reifying and substantiating nature. Furthermore, what is worth consideration is whether the divinity of nature (whatever that means) is a necessary condition for human beings to value and conserve nature. Some ecocentrists and deep ecologists concern themselves with the idea that if nature is not taken as divine, or if there is no intrinsic value in nature, then nature could be taken as an object at human disposal from an anthropocentric perspective. However, I shall put forward a possible alternative to ecocentrism and anthropocentrism.

All in all, the above discussion shows abundant meanings of the concepts of nature across numerous studies in the past. They can provide food for thought with respect to education. In this view, the exploration of nature is taken as fundamental for developing educational thought and practice.

However, these two types of enquiry --- education-based and nature-as-key-concept-based enquiries --- cannot be exclusively separated. The understanding of nature underpins educational ideas and practices, whether or

not it be taken as an explicit object to learn about. Educational philosophical enquiry into the concept of nature can be articulated as the investigation of the meaning of nature and its educational implication and also the investigation of the nature of education. In this respect, Bonnett (2003, 2004, 2007) has provided insights into the metaphysical meaning of nature and education. After examining the notion of nature and its related environmental issue, Bonnett (2003, 2007) identifies the features of nature as a self-arising and epistemological mystery. These features of nature suggest that, ontologically, there is always difference between human and nature and, epistemologically, there is always something in and about nature beyond human understanding. Here we may find an interesting parallel between the concept of nature in the Western context and the concept of Dao in an Eastern background.

Overall, the overview of the enquiries inspires me to propose five themes consisting of polarities as the anchors for exploration. They can be understood as five kinds of dialectic of the interrogation of nature. The five themes with polarities are as follows:

1) Should "nature" be understood as becoming or being? Which conception could be more educationally meaningful? What might be offered by these two views?
2) What kind of conception of the *telos* (purpose) of nature could be helpful for a meaningful learning? Should the *telos* be taken as immanent or transcendent? Divine or non-divine?
3) What kind of human attitude towards nature could bring more and richer meaning to education? A disenchanted or enchanted view?
4) What kind of human/nature relationship could be helpful for conceiving more and richer meaning for learning? An anthropocentric or what I will term an anthropo-non-centric view?
5) The above discussions lead us to explore different pedagogical approaches to nature. What kind of pedagogical approach to nature would be significant and desirable? A disengaged or engaged approach?

The exploration of the meaning of nature guided by the five themes will reveal that some of the underpinning ideas about nature, humans and their relationship might tend to impoverish the meaning of education and deepen the pitfalls in the present curriculum and educational practices. These notions will be summed up as "anonymising view". In addition, it will also reveal some of the underpinning ideas to be helpful for conceiving more and richer meanings of nature for education. These ideas will be referred to as "authoring view". The exploration of Chapters 3 to 7 is a process of unpicking the notions of anonymising and authoring views.

Chapter 3 focuses on the metaphysical assumption of nature. This thesis argues that there are two basic metaphysical positions through history: philosophy of being and philosophy of becoming. Both positions can be traced back to ancient Greek philosophers including Heraclitus, Parmenides, and atomists. This chapter will argue that philosophy of being has greater and more explicit influence on current educational ideas and practices than philosophy of becoming. Philosophy of being in this sense can be understood as one of the factors resulting in the pitfalls in current curriculum. In contrast, philosophy of becoming may offer a different, more dynamic and interesting view for understanding nature, humanity and education and thereby help to improve current educational practices.

Chapter 4 explores the meaning of nature regarding the *telos* (purpose) of nature. The *telos* of nature is related to divinity which has been one of the most important enquiries into nature in human history. The debates on the notion of physico-theology mark out two important and different conceptions of *telos* of nature: nature with immanent divine *telos* and nature with transcendental divine *telos.* These debates have important origins in ancient Greek philosophers including Plato and Aristotle and Enlightenment thinkers, especially Hume and Kant. I will discuss the debate and demonstrate how these concepts of divine nature influence our views of humanity, knowledge, and our world. However, evolutionary biology brings us the third conception of *telos* of nature: nature with immanent non-divine *telos*. This thesis points out that three kinds of *telos* of nature can be conceived and that different conceptions of *telos* assume different metaphysical positions. In my view, nature with divine *telos* is grounded on philosophy of being and results in a deterministic view of education, while nature with non-divine immanent *telos* is in tune with philosophy of

becoming. This conception of *telos* of nature can yield more benefits for developing a freer and meaningful education than the conception of divine *telos*.

Chapter 5 aims at revealing the meaning of nature in respect of epistemology. Nature has been recognised as disenchanted or enchanted in history through different perspectives. However, an understanding of nature as enchanted or disenchanted entails not only knowledge of nature itself but also the means of acquiring knowledge of nature. The idea of disenchantment has aroused innumerable discussions and criticisms. It can be understood in terms of Weber's (1948) "intellectualisation" and "rationalisation", Habermas' (1971) "technical interest" and "instrumental knowledge" and Husserl's (1970) "naïve naturalistic attitude", whereas the idea of enchantment is often explained in terms of divinisation. However, what interests me most is the attitude or ethos involved. This thesis demonstrates that, on the one hand, modernist scientists and thinkers, such as Galileo, in early modern times make significant contributions to the formation of disenchantment or disenchanted ethos. On the other, Romantics, such as Rousseau and Wordsworth, have significant influence on the understanding of enchantment and an enchanted ethos. The demonstration will reveal that a disenchanted view is inappropriately overemphasised in mainstream educational discourses and thereby results in an oversimplifying curriculum. Hence to pay more heed to an enchanted view in curriculum may help to improve the unbalanced situation and direct us towards a meaningful, interesting and desirable education.

Chapters 3 to 5 are the elaboration of the fundamental philosophical position of this thesis. On this ground, Chapter 6 extends the concern to the human/nature relationship, Chapter 7 to the learning approach. Chapter 6 explains a main perspective concerning the human/nature relationship --- anthropocentrism. Anthropocentrism has been criticised as one of the central factors of environmental crisis and many countervailing views have been proposed as solutions. However, these views may ignore the inextricable and dialectical interrelationships between the conceptions of nature and humanity. Drawing on the idea of deconstruction of Derrida (1969, 2002) and Agamben (2002), I suggest an anthropo-non-centrism as a new perspective towards the understanding of the human/nature relationship. This anthropo-non-centrism reveals the interdependence and intertwinement of the

understanding of humanity and nature and thereby inspires different and novel meanings for education.

Chapter 7 focuses on the approach to learning. According to the previous exploration, I propose two learning approaches: disengaged and engaged. In some sense, they are similar to but not exactly identified with the surface and deep learning approaches in the field of learning theory (Marton & Säljö, 1984). The disengaged approach to learning stresses the collective and disembodied parts of experience which have been taken for granted in learning, while the engaged one emphasises the personal and individualistic parts of lived experience. In my view, the engaged approach to learning is more beneficial than the disengaged one for producing richer and more meanings in the lifeworld. Drawing on Husserl (1913/1931, 1970) and Merleau-Ponty (1962, 1962/2003, 2004), the idea of lifeworld can be understood not only as a collection of ordinary life experience common for all but also an assemblage of unique, private and personal lived experience each unique to one individual, but with shared elements (Hung & Stables, 2008). The interpretation of the lifeworld as private lived experiences is crucial for understanding how inexhaustible meanings can emerge from our own lived experience. Chapter 7 will argue that an engaged approach to learning is an appropriate means for exploring our lifeworld as a source of meaning.

After exploration through the five themes, the views tending to result in impoverishment of meaning are generally called “anonymising orientation”, while the views beneficial for the generation of meaning are referred to as “authoring orientation”. Chapter 8 will remark on how the authoring-oriented view can improve the understanding of the concept of nature and enrich the meaning of education and life in general as well as overcome the pitfalls of our present curriculum in particular. The educational implications of the authoring-oriented view will be discussed in three respects: meaning of education in general, education about and for nature and nature in a particular system of education (the Taiwanese curriculum).

The meaning of the authoring view of education will be articulated with regard to metaphysics, epistemology, educational anthropology and ethics. This thesis takes the metaphysical position of a philosophy of becoming and a constructive view of knowledge. On this ground, the human image can be depicted as primarily an author,

who also plays the roles of an inventor, an adventurer, an agent and a poet. This anthropological view leads to an ethics of responsibility since every individual is an irreplaceable authentic author who cannot escape from her responsibility for herself and the world. The understanding of the meaning of the authoring-view of education is helpful for reflecting on education about and for nature. How can an education about and for nature be developed? Three aspects will be considered: nature as the object to be learned about, nature as the surroundings to be learned within, and nature as a guide to be learned from. The above concluding remarks are helpful for envisaging a prospect of a more meaningful educational practice. Based on the authoring view, I will return to the Taiwanese curriculum and make suggestions for overriding its shortcomings of homogenisation and disembodiment.

2

Nature in Current Educational Practice: The Taiwanese Curriculum

This chapter aims to show that the concept of "nature" in current educational discourse has been over-simplified. The Taiwanese curriculum will be proposed as an example for analysis and examination to demonstrate the over-simplification as "homogenisation" and "disembodiment".

As mentioned, the concept of nature is significantly related to the extent of the meaningfulness of education since it is often referred to, implicitly or explicitly, when many assumptions are made about humanity, nature, science, deity, etc. Thus it should be taken seriously as an important issue for education. None the less, it seems difficult to find general educational literature focusing explicitly on the concept of nature. The concept "nature" is often implicit in assumptions about human nature or natural law or natural environment without being used explicitly. To some degree, assumptions about human nature and nature have been taken for granted. This point shows that it is important to investigate the meaning of nature in general discourse because this investigation can help to uncover the taken-for-granted conceptions of nature assumed in educational practices.

There might be another reason that the concept of nature attracts increasing attention. It could be related to anxiety about the escalating environmental crisis. The environmental crisis reminds educational thinkers and practitioners of the importance of our own "natural" environment and the related education. Certainly, in the late 20th century, issues related to natural environment and environmental problems have been

highlighted in the educational field. There are some prominent examples: many international and national organisations aiming at the promotion of environmental education have been set up in the past decades and they call for and undertake numerous actions or strategies for implementing environmental education in all levels of education; moreover, various related new pedagogic fields appear, such as environmental education (EE), education for sustainable development (ESD) or education for sustainability (ES). The emergence of these organisations, these educational fields and the related discourses in some sense shows an increasing public environmental concern. For example, many frameworks have been proposed to "inspire and guide the peoples of the world in the preservation and enhancement of the human environment" such as *The Stockholm Declaration* (UNESCO, 1972), *Tbilisi Declaration* (UNESCO-UNEP, 1977), and so on. The concept of nature seems to be taken for granted as a synonym of natural environment by these frameworks. However, this assumption may diminish and lessen the meaning which nature could bring to our learning because "nature" does not necessarily refer to the natural environment.

If we recall how we use this term in our ordinary language, we may surprisingly find that there are many ways of understanding and usages in relation to nature. For example, it may refer to natural law, the wild, the essential property of a thing, the disposition or temperament of a person, human nature, the quality opposite to the artificial and so on. There are many more ways of using this term. Thus we may understand why Raymond Williams (1980, p.67) remarks that "nature" is one of the most complex words in the language. In addition, he admitted that, "I've previously attempted to analyse some comparable ideas, critically and historically. Among them were culture, society, individual, class, art, and tragedy. But I'd better say at the outset that, difficult as all those ideas are, the idea of nature makes them seem comparatively simple" (Williams, 1980, p.67). When nature is merely taken as a synonym of natural environment, its meaning becomes poor because the ways of conception and experience of nature are limited, and so therefore is the education related to nature, on such an understanding. If the concept of nature has been more fully and sufficiently explored then it will be found that it is not merely equivalent to "environment" or "wilderness". Thus when nature is understood as a synonym of environment, no more

and no less, its rich and abundant meaning could be lessened and impoverished; in this case learning about nature should not be taken as EE, ESD, ES or SE.

One problem can be detected from the tendency to take education related to nature as environment-related educational fields such as SE, EE, ESD or ES. Basically, the establishment of these disciplinary fields relies much on the knowledge of scientists and experts in natural science. In the expert-dependent educational perspective, nature tends to be taken for granted as a physical, external and substantial natural world and as an instrument for providing kinds of resource for human exploitation and well-being. This might cause a myth that education about nature (natural environment) is mainly the task of science education and thereby the possible contribution of other fields such as art, humanities or physical education could be underestimated or limited. Jensen and Schnack (2006) admit that there is a strong tendency of scientism in environmental education; the focus of environmental education has often been to give pupils substantial knowledge about environmental problems without addressing the social values implied in "seeing" the problems. This point will be supported by the analysis of the Taiwanese *Grade 1-9 Curriculum Guidelines (G1-9 CG)* (Ministry of Education, MOE, 2006) in the following section.

2.1 The Taiwanese Grade 1-9 Curriculum Guidelines as "Glocal" Practice

Here I take the Taiwanese *Grade 1-9 Curriculum Guidelines* (Ministry of Education, MOE, 2006) as an example for analysis to demonstrate the limitedness of the meaning of nature in the current educational practices. I will argue that this limitedness can be understood as resonance of a general trend in present education rather than a result of a peculiar culture or tradition. Thus the analysis of the Taiwanese curriculum guidelines leads this thesis also to explore the meaning of nature in the "Western" context.

The development and implementation of the Taiwanese curriculum guidelines can be understood in some respects as closely related to global changes of economic and socio-political conditions including globalisation and democratisation (Kennedy, 2008; Law, 2002, 2004a, 2004b; Lee, 2004). The Taiwanese curriculum guidelines are the product of following the international curriculum reform movement in respect of historical background and substantial content. The current Taiwanese curriculum guidelines can thus be understood as a local response to globalisation, or a "glocal" practice in education. In order to clarify this point, I first give a brief introduction of the background of the development of the Taiwanese curriculum.

2.1.1 Background of the Taiwanese Curriculum: Overview of Taiwan's History and Cultural Context

Taiwan's recorded history can be traced back to the 16th century. In the 16th century, on the way of sailing to Japan, Portuguese had a glance of Taiwan and called it "Ilha Formosa", meaning "Beautiful Island" (Su, 1986). The earliest inhabitants were Malayo-Polynesian peoples who are referred to as "aborigines" or "indigenous peoples" (Su, 2007). During the past 400 years, many immigrants have moved to Taiwan, most of them from the southern provinces of China. Meanwhile, Europeans, Chinese and Japanese established their dominion over this island at different times. Before the end of World War II, Taiwan had been governed by Dutch (1662-1661), Spanish (1626-1642), Zheng Cheng-gong (1661-1683), Ching (1683-1895), and Japanese (1895-1945) (Mao, 1997, 2008; Su, 1986; Su, 2007). Since 1945, Taiwan has been governed by the Republic of China government --- mainly led by Chiang Kai-shek's party --- Koumintang (KMT, or Chinese Nationalist Party).

The historical-political background has been deeply embedded in the development of the Taiwanese curriculum, in a very complicated and complex way. In the year 1947, two years after Taiwan was taken over by the KMT government, a massacre (the 2.28 Operation) slaughtering protesters against government and innocent civilians was conducted by the government and resulted in a forty-year rule of martial law. Since then, the educational system has been regarded as an important

state apparatus by the ruling party KMT to maintain its one-party authoritarian regime. All levels and all kinds of education were put under severe control and surveillance until the 1980s. The design of curriculum and publication of textbooks was under the control of government. Most authors (Hwang & Chang, 2003; Doong, 2008; Tsai, 2002) agree that the mid-1980s can be taken as an important time, since then the Taiwanese curriculum was about to change.

Before the mid-1980s, the aim of the Taiwanese curriculum was to fortify KMT's ruling authority by indoctrinating pupils with Chinese tradition and culture. KMT and its leader Chiang Kai-shek claim that their fundamental ideology inherits Chinese orthodoxies which Chinese communists intend to destroy. Thus Chinese traditional doctrine in this sense is not only used to provide legitimisation of KMT's ideology and ruling authority but also as a thinking apparatus confronting communism and the other sets of beliefs that could possibly challenge KMT's ruling authority --- in the name of protecting Chinese tradition. Education in this period of time was "Chinese-ised" to a great extent; curriculum was thereby heavily "Chinese nationalised" (Tsai, 2002). Curriculum was designed to foster patriotism, loyalty and obedience to government (or the particular political party and its leader). In order to achieve this goal, the edition and compilation of textbooks must strictly observe the official Curriculum Standards, which were firstly issued in 1929 in mainland China and had undergone several revisions until 1993 (Lee, 2008; Shoon, 2000). The rationale of the Curriculum Standards aimed to shape primary school pupils to be "energetic children and good citizens" (MOE, 1993) while for secondary school pupils "optimistic youngsters and good citizens" (MOE, 1995).[5] The first objective of the curriculum standards for primary education is to enable pupils to be "diligent, hard-working, conscientious, obedient to the law, allegiant to family, hometown, state and the world" (MOE, 1993). While in secondary education, the primary objective is to enable students to be "nationalistic, patriotic, allegiant to family, hometown and state" (MOE, 1995). Yet the term "hometown" in the curriculum does not refer to the island Taiwan but mainland China --- a country where many Taiwanese have never

[5] The previous curriculum standards for primary education and secondary education were separately mandated. The earliest edition of Curriculum Standards for primary education was issued in 1929, while for secondary education in 1922. The curriculum standards for primary education had been revised for 11 times while for secondary education 18 times until the new curriculum guidelines were issued. The quotations of the rationales of the standards are cited from the latest editions.

stepped on. In brief, the Taiwanese curriculum can be characterised by authoritarianism and mono-cultural Chinese-isation from the 1950s to the mid-1980s.

Since the 1980s, as many authors (Law, 2002, 2004a, 2004b; Held, McGrew, Goldblatt & Perraton, 1998; Waters, 1995) have pointed out, globalisation started to become a prevalent phenomenon all over the world. "The international flow of capital, goods, services, information, and people, aided by developments in information and communication technology, has accelerated and intensified throughout the world" (Law, 2004b, p. 500). The "Western" ideas of democracy and liberty sneaked in with Taiwan's economic development. Chiang Kai-shek died in 1975, and his son succeeded as the new president. However, the new successor showed some and slow tolerance to "Western" values. Discussions on public issues were allowed as long as they did not challenge the authority of government. The martial law was finally lifted in 1987, one year before Chiang died. The regulations of inspecting the press and controlling the mass media were denounced in 1988, the law of prohibiting the formation of political parties in 1989. In 1996, Taiwanese people could vote for a president for the first time. The changing economic-socio-political conditions during these two decades opened up a space for debates over educational and curriculum reform.

In the early 1990s, a wide range of social activists demanded educational reform, asking for deregulation of the Taiwanese heavily-bound educational system: for example, the joint entrance examination, the textbook policy, and the state's control over curriculum (Doong, 2008). What is more important is that the political authoritarianism in the disguise of protection of Chinese orthodoxies in curriculum has been challenged. Some authors interpret this challenge as a tension between Chinese-isation and Taiwan-isation (Tsai, 2002; Law, 2002), localisation and internationalisation (Hwang & Chang, 2003), or between nationalisation and localisation, sinoisation and indigenisation (Mao, 1997, 2008). In my view, the crucial tension exists between centralisation and decentralisation, monologism and heteroglossia. The educational systems before the mid-1980s were under severe centralised control; moreover, the curriculum only presented the very limited "Chinese-ised" view. Many narratives were excluded from the centralised and "monolingual" field of curriculum. For example, the 2.28 Operation was strictly

forbidden to public discussion; the Dutch, or Spanish or Japanese rulers were described as cruel invaders without mentioning their great contribution to education and development in many other respects. The indigenous people's stories were rarely told; they were described as barbarians (hunting for man) in textbooks, waiting to be "civilised" by Chinese culture. Moreover, Mandarin was approved as the only legal and official language in schools, and pupils would be punished for speaking dialectics. Many restrictions and regulations were set in the curriculum standards in order to maintain the ruling authority. The previous curriculum standards were highly centralised and mono-cultural (Chinese). Overall, various social movements arose in the early 1990s, asking for deregulation, democratisation and liberalisation. They challenged the monopoly-authority and its underpinning centralised and Chinese-ised ideology and caused the following curriculum reform.

The most impressive achievement of the curriculum reform in the 1990s is the development of the new curriculum guidelines: *Grade 1-9 Curriculum Guidelines*. After years of study, these curriculum guidelines were mandated and implemented in 2001. These new curriculum guidelines are very different from the previous curriculum standards in many aspects. For instance, the curriculum standards set a very strict limit for teachers and textbook publishers to plan the curricula and design the textbooks, thus the contents of school textbooks were under highly severe control. The new curriculum guidelines only propose the minimal requirements as the references for teachers, textbook designers and editors. Compared with the standards, these new curriculum guidelines are characterised by the features of decentralisation, deregulation, democratisation and liberalisation. In some sense, the development of the new curriculum guidelines can be seen as an achievement of integrating the "Western", modern values into the process of Taiwan-isation (or indigenisation), translating globalisation into local (Taiwanese not Chinese) context.

According to many authors, (Law 2002, 2004a, 2004b; Mao, 1997, 2008), globalisation, democratisation and educational reform are indivisible parts of socio-political change in Taiwan from the late 1980s to 2000. Some supportive evidence can be found in the G1-9 CG (MOE, 2006). The rationale of the G1-9 CG (MOE, 2006) aims to achieve pupils' national citizenship and international vision by improving pupils' understanding in humanism, practical competence, democracy, localisation

and internationalisation, and lifelong learning. Although the concepts of humanism, democracy, localisation, and internationalisation are not given clear definition, apparently the inclusion of these concepts into the curriculum reveals a concern for "non-Chinese" worldview implied in the curricular development. The notions of localisation (Taiwan-isation) and internationalisation which were invisible in the previous curriculum standards are emphasised in this new curriculum. Moreover, the idea of individual learning or education with respect to individual difference appears in the new curriculum guidelines, challenging the authoritarian approach to learning which is highly valued in the previous curriculum standards (MOE, 2006). Some authors, such as Mao (2008), take the previous curriculum standards as "Chinese-centric", while the current curriculum guidelines "Taiwan-centric". In my understanding, this view could over-emphasise the effect of Taiwan-isation of the new curriculum since the new curriculum does not remove any learning content related to Chinese language, tradition and culture. It merely opens up a possible space to invite the excluded narratives to come in. The curriculum reform in Taiwan moves towards a direction which is more inclusive, tolerant, diverse, democratic and consonant with the globalised trend --- although there is much space to be filled. Thus the new curriculum, in my view, is distinguished from the previous standards by the features of decentralisation and deregulation, which are responses to globalisation comprising multiple economic, political, social influences and cultural ideas.

2.1.2 The Taiwanese G1-9 CG as Local Response to Globalisation

The previous examination of the background of the Taiwanese curriculum shows that the development of the guidelines can be understood as a local response to globalisation. Therefore, I take the Taiwanese curriculum guidelines as an object for revealing the view of nature implied in the general current educational thinking and practices. Three reasons are provided as follows:

First of all, the educational reform in Taiwan is not a peculiar phenomenon of parochialism; but rather, it is a phenomenon of "glocalisation" in some sense. For example, it is described in the preface of the Taiwanese curriculum guidelines that the

aims of the curriculum include the fostering of the local identification, patriotism and global citizenship (MOE, 2006) The Taiwanese curriculum guidelines exemplify an attempt to integrate the trends of globalisation and localisation.

The second reason is related to a broader context. The current Taiwanese educational institutionalisation and the schooling systems are basically adopted from the Western tradition. The ancient Chinese educational system for classical study, for example, Shu Yuan, has been in decline for more than a century. The explicit educational systems and the underpinning views about educational institutionalisation are largely taken from the West.

Thirdly, it can be found that the perspective of forms of knowledge, epistemology, disciplines and curriculum in the new Taiwanese curriculum guidelines is, to a high extent, Western. As mentioned, the development of the new curriculum integrates "Western" values into its rationale. The "Western" influence can also be found in the content of objectives and competence indicators of the curriculum. For example, the parts related to environmental education and the issue of nature embrace elements of contemporary environmental thinking (viz. Western environmental philosophy and ethics). (More details will be discussed in the following section.) In addition, as mentioned in Chapter 1, the study of Weller (2006) shows that the view of nature in current Taiwanese society has been heavily westernised under the influence of globalisation. Furthermore, the distinguishing part of the new curriculum guidelines from the previous standards is the addition of the core competence and the competence indicators. According to Shong (2000), the process of the research and development of the Taiwanese curriculum has taken the Australian curriculum as an important reference, especially with respect to core competences and competence indicator. At the beginning stage of the curriculum reform in the early 1990s, a Commission on Educational Reform (CER) was organised (Doong, 2008). CER held several forums to collect experts' and public opinions about educational and curriculum reform. In the first forum held on 31st August 1995 and the second forum on 18th December 1995, the Australian experience was presented as a model (Shong, 2000). On 28th June 1996, CER held a seminar whose theme was "Towards New Education in the New Millennium: the Australian Key Competence" and the Prospect of the Taiwanese Educational Reform". From 1996 to 2001, the new curriculum

guidelines were under discussion and development. There is no detailed record of the process of the development; however, the new curriculum came out in 2001 with 10 core competences as substantial benchmarks for designing textbooks, and making assessments. According to the above, I may conclude that the new Taiwanese curriculum is an achievement of local educational reform greatly influenced by many global elements and is thus of international as well as national interest. I thus take the curriculum guidelines in Taiwan as a staring point to commence the exploration of the meanings of nature, which will put the main focus on the Western tradition.

2.2 Nature in the Taiwanese Curriculum

As mentioned, the *Grade 1-9 Curriculum* has been mandated and implemented since 2001. There are many distinguishing features of the *Grade 1-9 Curriculum Guidelines* to make the curriculum guidelines different from the previous curriculum standards. In general, teachers can have more freedom to decide the material and pedagogic methods according to the G1-9 CG than under the previous curriculum standards.

According to the G1-9 CG, seven main or core learning areas are the required subjects including Language Education, Health and Physical Education, Social Studies, Arts and Humanities, Mathematics, Science and Technology, and Integrative Activities (MOE, 2006). Moreover, there are six additional subjects including Information Education, Environmental Education, Gender Equity Education, Human Rights Education, Career Education and Home Economics Education. These non-required subjects are not taught as an independent subject as the required subjects are. According to the guidelines, the way of teaching of the additional subjects in schools is to integrate their concepts, knowledge and skills into the main required subjects.

Now let us examine the G1-9CG to show how the concept of nature is used, understood and interpreted. First of all, after a survey of the curriculum, we may find scant references to the term “nature” in the whole *Grade 1-9 Curriculum Guidelines* except the Science and Technology Education (STE) and Environmental Education

(EE). STE and EE are the two areas having more references to the term "nature" more often than the other areas; they take "nature" as a prominent issue. Thus STECG and EECG will be more fully examined in the following sections.

The other learning areas have very few references to "nature" and its meaning is very limitedly understood in the Taiwanese curriculum. Next let us have an overview of the G1-9CG except the STECG and EECG. It will reveal the scantiness and limitedness of the concept of nature used in this curriculum.

The Language Education curriculum guidelines (LECG) aim at explaining the contents and purposes including the required knowledge, skills and understanding from the perspective of language and literary learning. The term "natural" is used once in the following description: "Learn to converse with people naturally (in order to have good manners)" (Competence indicator 1-2-5-3, MOE, 2006).

The term "nature" or its relative "natural" appears twice in the Mathematics Curriculum Guidelines (MCG) in a very interesting way. The rationale of MCG presents three features of mathematics as the reasons for taking mathematical education as an important part of fundamental education. The three features as reasons are worth exploration:

> *1) Mathematics is one of the most important human possessions.*
> *Mathematics is acknowledged as the foundation of science, technology and thoughts and the criterion and the driving force of civilisation…*
>
> *2) Mathematics is a form of language.*
> *Mathematics is like a native language; it can be found in many aspects of human life. Mathematics is the purest and the most precise form of language and rationality. From the perspective of mathematical history, mathematics is the most natural language used to know nature.*
>
> *3) Mathematics is an extension of human talent."*
> *The instincts of trial-and–error, devising strategy and problem-solving and the institutional conceptions of form and number develop into mathematical thinking. (MOE, 2006, translated by the author)*

The above understanding of the features of mathematics in relation to the meanings of human "possession", "talent", "instinct" and "intuition" seems to be inconsistent and contentious, in my opinion. On the one hand, the view of mathematics as a human possession (or an asset) suggests mathematics as a reified object; on the other, mathematics is taken as a development of inborn human talent --- perhaps indicating the way our brains work. However, this section does not aim to solve the contentious ambiguity; it will be more fully discussed in Chapter 5 in relation to the discussion of the disenchanted view of nature. Yet what needs more notice here is the second point which takes mathematics as the most "natural" language used to know "nature". Some points need illumination: firstly, the term "the most natural" seems to suggest "the best", implying a value judgement. "Nature" could be understood as the source or the criterion of value. The point related to the value of nature will be more fully argued in Chapter 6. Secondly, according to the MCG, the best tool for human beings to understand the nature is to use the natural and inborn human talent, mathematical ability. The ideas of "goodness", "rationality", "human" and "nature" are assumed as interrelated; what concerns me is that there is no further argument or justification of this assumption in MCG. It seems careless for the MCG to make this claim. Yet the MCG has already been implemented. In my view, this belief in mathematics, human rationality and mathematical nature seems naïve. In Husserl's (1970) terms, this attitude could be understood as the "naïve naturalistic attitude". In chief, "naïve naturalistic attitude" can be defined as the belief that nature and natural science can be fully mathematically understood by human rationality since pure mathematics is fundamentally "pure science of ideas" and "science of possible objects in general as objects determined by ideas" (Husserl, 1970, p. 310). This point will be elaborated in the last section of this chapter and Chapter 5; however, we may find conceptions of nature as mathematical realm, human intellect as mathematical mind in MCG. In addition, this attitude is related to the anthropocentric view of human/nature relationship, which will be fully discussed in Chapter 6.

The term "nature" is used only twice in the rationale of the Social Studies curriculum guidelines (SSCG) (MOE, 2006). According to the rationale, "The scope of social studies composes the interrelations between human beings, society, man-

made environment and natural environment" (MOE, 2006). It is apparent that the term "natural" is used as an adjective to describe "nature" as a natural environment, a physical environment. In this sense, "nature" is natural environment.

A very similar situation can be found in the Arts Education curriculum guidelines (AECG). The term "natural" also appears two times in the AECG but its meaning is somewhat different from that in SSCG (MOE, 2006). The term "nature" or "natural" is basically used to describe "the quality or property opposite to that of the 'artificial' or 'man-made'". It is thus used to denote features of the "natural object" distinguishing from "artworks". However, the meaning of "natural" in this context might be different from that in "natural" environment. But it is difficult to explore the meaning of nature from such meagre references --- two in 9176 --- the total number of the words of the AECG.

The term "nature" appears only once in the Health and Physical Education curriculum guidelines (HPECG). HPECG points out the HPE aims to establish human well-being which consists of three aspects: individual physical growth and development, the interaction between individual and society and the interrelation between humans and nature (MOE, 2006). However, there is no further and clear definition and explication of the concept of nature. For example, the competence indicator 7-1-5 in the following part of HPECG aims to enable pupils to "learn the notion that humans are parts of nature; actively care about environment in order to protect human health" (MOE, 2006). Here we may find that the concept of nature is narrowly taken as physical environment which is an instrument of human well-being or health. Again, there is no explanation of how and why nature as a physical environment can enhance human well-being.

Overall, the Taiwanese curriculum guidelines except EECG and STECG refer very little to the term nature. Even when this term is used, it is taken almost as a synonym of natural environment without questioning and examining its meaning. If the concept of nature is taken in such a thoughtless and careless way in the curriculum, it is likely that educators will ignore its implications for education and teach about this concept in an impoverished sense.

However, the fields related to EE and SE pay more heed to the concept of nature. Thus the EECG and STECG in the *Grade 1-9 Curriculum Guidelines* can provide us

with more understanding about how “nature” is presented and taught in the present curriculum. The following discussion will focus on the EECG and STECG to reveal more about nature in current educational practice.

2.2.1 Nature in EECG

The EECG (Environmental Education Curriculum Guidelines) is composed of five parts: a) rationale, b) learning objectives, c) competence indicators, d) suggestions for integrating EE with the core learning subjects and e) the contents of learning objectives. The rationale gives a definition of the background and the importance of EE. The learning objectives define the main learning targets including knowledge, skills and understanding. The fourth part provides the principles for integrating learning across the curriculum. The last part: “main contents of the learning objectives”, explains the content in detail involved in the knowledge, skills and understanding of the learning objectives.

The “learning objectives” and the “main contents of the learning subjects” provide the materials for revealing the implied views of nature. According to the Grade 1-9 Curriculum Guidelines, there are five types of learning objectives. The learning objectives of environmental education can be explained accordingly:

1) *environmental awareness and environmental sensitivity: the ability to be aware of and sensitive to the various environmental degradations, pollutions and beauty of the natural and artificial environments through the training of sensory and perceptual abilities to observe, classify, rank, locate in space, measure, infer, predict, analyse and interpret.*
2) *conceptual knowledge about environment: the knowledge of ecological science, environmental problems (e.g., greenhouse effect, landslides, river pollution, nuclear pollution, air pollution, energy problems and so forth), and the influences on social culture (including the concepts of sustainable development and biodiversity),*

and environmental lifestyle and actions (such as conservation of energy, recycling, simple lifestyle, green design, green consumption, non-nuclear policy and so forth).

3) *environmental value system and attitudes: the positive environmental attitudes of appreciation of nature and its system, of being critical on the environmental issues, of appreciation and inclusion of different cultures, of caring minorities and future generations.*
4) *environmental action skills: the abilities to identify and study the environmental problems, to collect information, to solve the problems, to make assessment, analysis and to put into action.*
5) *environmental active experience: the ability to integrate the learning into daily and (neighbouring) community life and thereby incite the belongingness and participation of communities. (MOE, 2006, translated by the author)*[6]

Three problems can be found from the EECG: mis-juxtaposition of the concepts of different categories, the arbitrary combination of irrelevant ideas and the ambiguous assumption of environmental ethics.

The first problem "mis-juxtaposition" can be found in type 1), 2) and 3). In learning objective 1), it is not very appropriate to understand the "sensational and perceptual abilities" as the abilities to "observe, classify, rank, locate in space, measure, infer, predict, analyse and interpret". Moreover, even if the ability to make good observation can be understood as making good use of part of the perception, it is untenable to interpret the ability to "infer, predict, analyse and interpret" as parts of sensory-perceptual functioning. It is more plausible to take these abilities as parts of rationality, even if that is "rationalisaion". This problem might be related to the cultural and linguistic tradition; in some respects, the usage of ordinary language in Chinese is freer and less precise and rigid than the European languages. Yet the concepts of rationality, sensation and affectivity should be defined in a more rigorous and unequivocal way in curriculum. These concepts included in curriculum could

[6] The learning objectives cited here are translated by the author for there is no English translation of the *Grade 1-9 curriculum guidelines*. The other citations of the curriculum guidelines such as the competence indicators are also translated by the author.

very possibly be taught to pupils as a matter of course without examination and clarification.

The second problem of "the arbitrary combination of irrelevant ideas" can be found in type 1), 3), 4) and 5). First of all, it may be dubious that the second learning objective of EE takes the concept of biodiversity as a socio-cultural idea resulting from ecological science and environmental problems. Secondly, in learning objective 3), it is difficult to understand how to relate the appreciation of nature to that of different cultures, minorities and future generations. The similar arbitrariness can be found in the objective 5) which introduces the concepts of (neighbouring) community, belongingness and participation of community life as the objectives; however, the EECG does not fully justify why the (neighbouring) community should be taken as an important part for environmental education although it could be, in my presumption, related to the idea of bio-regionalism in contemporary environmentalism. Whether the (neighbouring) community can be beneficial to EE or not, whether it is underpinned by bio-regionalism or not, the quest needs to be justified. The EECG should invite educators and learners to think about why and how the (neighbouring) community can or cannot play an important role in improving environmental education rather than just take it for granted. In addition, what needs more exploration is the importance and influence of the other kinds of groups such as society, nation or state for improving EE. It is difficult to understand why the other concepts of groups are absent in the guidelines. Learning objective 4) shows a high extent of arbitrariness or irrelevance. The action skills as the learning objective 4) are skills in general rather than particular action skills exclusively belonging to the field of EE. It is not sufficient to list these action skills in this part. They should be presented as action skills across the curriculum.

These problems may cause difficulties in teaching EE. With respect to the concept of nature, the terms "nature" and "natural" are explicitly used in the learning objectives of the EECG only two times: in the first and the third learning objectives. In the first case (learning objective 1), the term "natural" is used as an adjective to describe the environment in contrast to the artificial environment. Viewed in this light, "natural environment" is used to refer to the non-built physical environment. In the second case (learning objective 3), "nature" is used in a vague way. As mentioned by

the EECG, environmental value systems and values include "the positive environmental attitudes of appreciation of nature and its system". It is difficult to outline a definite meaning of nature. We can now refer to the fifth part of the "main contents" related to the third type of learning objective. The EECG points out that the main contents of "the positive environmental attitudes of appreciation of nature and its system" can be explained as the following view of environmental ethics:

> *Environmental ethics: anthropocentric ethics, biocentric ethics and ecocentric ethics: including the understanding of the interrelationship and the interdependence between humans and the environment and respecting the values of various life forms and the ethical relationship between humans and different life forms. (MOE, 2006, translated by the author)*

There is no specific term "nature" or "natural" used in the above paragraph; however, "nature" or "natural" seems to be assumed to refer to the physical surrounding world and non-human beings. With regard to the human/nature relationship, the EECG presents three positions of environmental ethics without further explanation. This presentation is somewhat confusing because it does not explicitly and clearly assert the purpose of the presentation and its relationship with teaching. This is the third problem of the EECG: an "ambiguous perspective about environmental ethics".

There have been debates over different positions of environmental ethics. If the purpose of the EECG is to inform educators and practitioners that there are various, or at least three theories of environmental ethics and these views can be introduced to pupils, the inclusion of the three positions in the EECG might be plausible but it needs more introduction and elucidation. If these views, i.e., anthropocentric ethics, biocentric ethics and ecocentric ethics, are taken as different stages of a continuous progress of an ethical view, then it is a very naïve educational assumption and far from critical thinking, let alone education for critical thinking.[7] Overall, the inclusion

[7] A similar view about the "paradigm" of environmental ethics can be found from R. F. Nash's work: *The Rights of Nature: History of Environmental Ethics* (1989). Nash argues for the evolution of ethics. In his view, the agents of morality increase with time, ranging from human beings to universe. He claims that even rocks have rights. Many philosophers point out that there are meta-ethical problems with this view. There is no convincing reason to adopt this view as the "only" perspective of

of the three views of environmental ethics in the EECG seems ambiguous and arbitrary. The value of learning about the meaning of nature and the human/nature relationship according to the guidelines is open to question on a number of fronts.

Overall, it can be found from the scant references to nature in the EECG that "nature" is basically understood as "natural environment" or a general physical world composed of plants, animal and physical objects. The human/nature relationship is mentioned without in-depth explication. In my view, it could be more dangerous to teach human/nature relationship without reflection than not to teach it since the human/nature relationship could be taken for granted. The meaning of nature and the approaches to learning about it tend to be simplified without further examination and reflection on the following two aspects: firstly, nature is taken as a physical world; secondly, the learning process is uncritical. The tendency towards over-simplification can also be found in the STECG, as will be revealed in the next section.

2.2.2 Nature in STECG

A simplified view of nature can be found in the STECG. The STECG is composed of five parts: a) rationale, b) learning objectives, c) competence indicators, d) suggestions for integrating STECG with the core learning subjects and e) principles of implementation (MOE, 2006). Let us examine the contents of the STECG to reveal its view of nature.

The rationale proposes the fundamental concepts of nature, science and technology. As stated by the first sentence of the rationale in the STECG, "Science is the outcome of the observation of nature and the study of the various phenomena within nature; technology is the outcome of the manipulation of nature to improve human life… We believe that all changes take place according to causal laws…Learning about and making use of natural phenomena and the implied natural laws result in various human inventions…Learning about and making good use of

environmental ethics in the curriculum guidelines. Environmental ethics is presented in the Taiwanese curriculum in a very straightforward and uncritical way. I am worried that the attitude towards nature that pupils learn from the curriculum could be passive and careless.

science and technology can benefit human life in the present and future. Nature, science and technology are inseparable" (MOE, 2006, translated by the author).

The above rationale stresses the connection between nature, science and technology yet, still, without clarifying the meaning and questioning the relationships of these concepts. There are very straightforward assumptions that nature is taken as a resource for offering materials to improve human life and that natural science and technology seem to be only the knowledge and tools to understand and exploit nature, no more and no less.

As in other parts of the Taiwanese curriculum, the term "nature" and the derivative terms including "natural environment" and "natural phenomena" in the STECG are used to denote the physical world, physical objects and the phenomena in the world. According to the STECG, the scientific and technological learning ability can be classified into eight types[8]. If we take a careful examination of learning ability, we may find learning abilities consisting of observation, classification, organisation, comparison, induction, reasoning and dissemination (MOE, 2006). These activities can be understood as the typical Baconian scientific methods for acquiring knowledge of natural science. For example, as described in the STECG, the procedure skill of stage 1 includes the following abilities:

Observation

Competence indicator 1-1-1-1

Be able to observe the features of objects by means of sensation.

Competence indicator 1-1-1-2

Be able to be aware the changes of objects due to the changes of properties.

Comparison and Classification

Competence indicator 1-1-2-1

Be able to classify objects according to their features.

[8] The eight types of scientific and technological learning ability consist of (1) procedural skill, (2) scientific knowledge, (3) essence of science, (4) development of technology, (5) scientific attitudes, (6) thinking skills, (7) application of science, and (8) scientific and technological design and manufacture (MOE, 2006).

Competence indicator 1-1-2-2

Be able to compare objects and identify the similarities and dissimilarities between them.

Organisation and Relation

Competence indicator 1-1-3-1

Be able to identify an event through observing a series of phenomena.

Competence indicator 1-1-3-2

Be able to describe an event through multiple observations of a situation.

Induction and Reasoning

Competence indicator 1-1-4-1

Be aware of the causal relationship between phenomena.

Competence indicator 1-1-4-2

Be aware of the similar effect from the similar situation.

Dissemination

Competence indicator 1-1-5-1

Be able to describe the result of observation in appropriate terms. (MOE, 2006, translated by the author)

The explication of the procedural skill is very similar to what Francis Bacon proposed as scientific methods in his *Novum Organum* (1620; Bacon, 2004) which had great influence on the following development of modern science and research methods. However, I do not mean to reject the Baconian method as an approach to nature; what I question is whether the Baconian method should dominate the STECG. It seems to denote that there is no other approach to nature. In my view, this preconception might result in a narrow way of learning about nature. The simplification of nature can be understood with respect not merely to the process of learning about nature but also to the understanding of nature.

Then STECG points out that scientific knowledge denotes knowledge about nature and the consisting components including natural phenomena, plants, animals, matters (or materials) and natural environments. Atomistic notions are assumed in the epistemology of the STECG:

> Competence indicator 2-4-4-4
> Learn about the properties of objects including particles as the components of objects and the notion of different objects consisting in different composition of particles or atoms. (MOE, 2006, translated by the author)

In addition to the notion of atomism, another notion implied in the view of nature is "mechanism", a doctrine that everything in the world can be explained by physical causes. The mechanistic view of nature can be found from the following descriptions in the STECG:

> Competence indicator 2-1-3-1
> Learn about the changes of natural phenomena and their causes.
>
> Competence indicator 2-1-3-2
> Learn about the knowledge that the motions or vibration of objects cause from the force and there are various forms of force through making toys.
>
> Competence indicator 2-3-4-4
> Learn about the interrelation between the air, earth and water.
>
> Competence indicator 2-4-6-1
> Learn about the relationship between forces and movements of object and the conversion of energy. (MOE, 2006, translated by the author)

The assumptions of an atomistic and mechanistic view of nature can be understood as "substance metaphysics". The substance metaphysics assumes that the world is 1) independently real, 2) unchanging and predictable in crucial aspects, and 3) made of "stuff" (Stables, 2007, pp. 55-56). However, these assumptions are dubious; they oversimplify the meaning of nature.

The competence indicators grounded on substance metaphysics can be found in the guidelines. The view of nature in the guidelines is mainly grounded on substance metaphysics. "Nature" is taken as a synonym for "natural world", the appropriate object for the study of natural science. As stated by the STECG: "Science is the outcome of the observation of nature and the study of the various phenomena within nature; technology is the outcome of the manipulation of nature to improve human life" (MOE, 2006, translated by the author). Nature is taken as a physical environment, an assembly of resources at human disposal; science and technology are the means for humans to make use of nature as much as possible.

2.3 The Pitfalls of Oversimplifying Nature in Curriculum

Overall, the examination the Taiwanese curriculum reveals that the meaning of nature in the present curriculum is quite limited. Nature is taught as a mere physical world within which all beings are composed of atoms and the composition can be fully explained by mechanics. This limited view of nature can be identified as two kinds of oversimplifications: homogenisation and disembodiment of nature.

The view is homogenised insofar as the composition of the parts of nature and the composition are homogenous. The quality and feature of components of every being in the natural world are uniform; there are rules of compositions in the natural world. As stated by the STECG,

Competence indicator 3-4-0-6:

> Achieve the belief that there is a general regulation underpinning the changes of the world. (MOE, 2006, translated by the author)

The homogenised view of nature can be found from the competence indicators listed above: the beings in the world are homogeneously reduced as the objects composed of uniform units (e.g., particles, atoms, and so for forth); moreover, the process of the composition is understood as complying with a general and homogeneous rule.

It is too simple to understand our physical world as equivalent to nature. If we consider human recorded history carefully, we may find that there have been a number of different views of nature in history, science and art. And the discourses about nature are still emerging; even in the field of natural science, the new physics or the so-called postmodern science such as relativity theory, quantum theory and thermodynamics. These are suggesting that nature cannot be explained fully by homogenisation, atomism and mechanism. This overturns many Baconian or modern scientific assumptions (Bohm, 1980, 1988, 1990; Heisenberg, 1999; Hilgevoord & Uffink, 2006; Nielson, 1931; Prigogine & Stengers, 1985). Moreover, contemporary science reveals that mechanism and atomism partly, not exclusively, explain the world. This point will be developed in the later chapters. Overall, in order to have meaningful learning experience about nature, the curriculum should present more views or stories underpinned by different views of nature. None the less, it is hard to find other perspectives about nature in the existing curriculum guidelines.

I will argue in the second part that the dominant view of nature in the *Grade 1-9 Curriculum Guidelines* is highly related to the view of nature assumed by modern science. However, there are various understandings of nature through history other than the modernist view. It seems not very plausible to preclude the other views. The most important reason is that the limited view of nature taught in curriculum might confine the materials provided to pupils and thereby set the limits of pupils' learning experience about nature. The limitation could decrease the potential diversity and complexity of the meanings in their learning. However, educational activities should broaden but not diminish the possibilities of achieving meaning because living is a process of meaning-constructing-and-experiencing, as Merleau-Ponty (2003/1962, p. xxii) reminds us with the following words: "Because we are in the world, we are

condemned to meaning…" If the possibilities of accessing meaning are decreased, life is impoverished to some extent. Educational activities should aim for meaningful, but not impoverished, living. Therefore, it is necessary to reconsider what kind of concept of nature has been ignored in our present curriculum; this reconsideration may help to keep us away from the trap of over-simplification and homogenisation. For us as educators, the task ahead is to examine and elaborate what has and has not been taught about nature in our curriculum, to identify existing inadequacies and to seek what kinds of concept of nature should be brought into learning to enrich education and life.

The second over-simplification of nature implied in the curriculum is related to the learning process or the pedagogical methods. It is what this thesis defines as the "disembodied view" or "disembodiment". Disembodiment denotes the following features: impersonality, neutrality, objectivity, universality, emotionlessness and disengagement. According to the STECG (MOE, 2006), the procedural skills, one of the eight types of science and technology learning ability, include the skills of making observation, comparison, analysis, organisation, relation, induction, reasoning and dissemination. If the explication of these skills is considered carefully, it can be found that the only skill related to the bodily function is the observation skill: "Observation skill: Competence indicator 1-1-1-1: Be able to observe the features of objects by means of sensation." (MOE, 2006, translated by the author). By contrast, the other skills can be understood as the various abilities of reasoning or rational thinking. A tendency towards disembodiment can be found among these scientific skills.

The disembodiment of skills denotes the process of educating pupils to be indifferent and objective observers by keeping their distance from what they learn about, keeping a scientific attitude, e.g., impartial, neutral and non-emotional attitudes, towards the "objects" that are to be learned and arranged in these learning "subjects". However, impartiality and neutrality are one side of the scientific attitude; indifference, emotionlessness and apathy are another. In this sense, this learning process, on the one hand, encourages pupils to develop the ability to grasp commonality and generality, but, on the other hand, it discourages the development of personal and private meaning and values as part of education. Two important ideas are related to disembodiment: "anonymity" and "disengagement". "Anonymity"

denotes the ignorance of the personal and particular characteristics by stressing the common, collective and general parts of human experience of nature and ignores the particular elements in individual experience; while "disengagement" denotes the notion of taking objects and the world as a certain reality or realities irrelevant, distant and external to human beings. Following this, paradoxically, the more pupils learn about nature the farther they remain separated from nature. The more scientific skills pupils acquire the more abstract the world appears to them. This is the learning process making and keeping the distance between the learner and her learning object, between the lifeworld and the scientific (or theoretical) world, between one's lived experience and knowledge. This could be understood as a "disengaged" learning approach, favouring the indifferent and detached attitude towards the learning subject matter. This point related to learning approach will be elaborated in Chapter 7.

Accordingly, the disembodied view of nature is very likely to define nature as an external and indifferent world which could be learned properly only through scientific disciplines which are common, universal and general to all human experience. This feature of disembodiment can be understood in Husserl's (1970) term of "naturalistic attitude".[9]

The "naïve naturalistic attitude" is taken by Husserl (1970) as one the cruxes of the crisis of sciences and humanities --- the crisis of witheredness of human culture, reason and spirit and the related unreasonable behaviours, such as violence. The most important point is that this attitude assumes scientific knowledge as the Truth and scientific method as the only instrument for attaining and discovering the Truth. On

[9] There may be different and contrasting meanings of the term "natural attitude" when Husserl uses it in different contexts. According to David Carr (1970), Husserl uses "natural attitude" in the *Ideas pertaining to a pure phenomenology and to a phenomenological philosophy. First book: general introduction to a pure phenomenology* (1913/1931) to denote the "theoretical attitude". In the first case, "natural attitude" is a synonym of "theoretical attitude", contrasting with the "pre-theoretical attitude". In the view of Carr, this "natural attitude" can be understood as a sort of "naïve realism" or a popularised version of "objectivism" which is what he criticises in the later work *The Crisis of European Sciences and Transcendental Phenomenology* (Husserl, 1970). None the less, in the latter work Husserl sometimes uses the term "natural attitude" to describe the "pretheoretical attitude of naïve lifeworld", or the "natural primordial attitude of original natural life". In the second case, this term is used to describe the pretheoretical character of lifeworld in order to criticise the scientism generally assumed in natural science. It is confusing to use the same term to express two different meanings. Therefore, in order to prevent the confusion, this thesis uses the term "naïve naturalistic attitude" to describe the presuppositions assumed in the modern science, which is also the objective under Husserl's critique in *The Crisis of European Sciences and Transcendental Phenomenology*. The discussions related to "naturalistic attitude" and "lifeworld" will be continued in this section, Chapter 5 and Chapter 7. Hereafter *The Crisis of European Sciences and Transcendental Phenomenology* will be referred to as *Crisis*.

this view, knowledge that can meet the requirements of disembodiment, objectivity, universality, neutrality, objectivity, detachment, and disengagement can be dubbed "knowledge". None the less, many authors including Horkheimer and Adorno (1972), Husserl (1970) and M. Midgley (2003) point out that science taken as the only instrument to discover the Truth is actually a myth.

However, to regard science as a myth does not mean to underestimate science ---- that is what scientists do to myth ---but rather to reveal the insufficiency or one-sidedness of human learning if science is seen as the only Truth. Although there are many critiques of science, the naïve naturalistic attitude and its implied oversimplification of "disembodiment" is still prevalent in our current curriculum and educational discourses. Drawing on D. Carr[10] (1970, p. xxxviiii), the disembodiment in learning to some extent encourages pupils to learn the "non-relative truth about the world". The more we learn about scientific attitudes, knowledge and skills, the more disembodied we become. According to the STECG, the reliability of the scientific is grounded on the precise record of the "facts as they are…and the repeatable experiments" (competence indicator 3-4-0-8, MOE, 2006). Viewed in this light, nature is, as claimed by the curriculum guidelines, a physical world composed of objects which can be comprehended by the disembodied scientific skills, through the disembodied process of learning.

However, disembodiment can impoverish the meaning of learning by narrowing down the meaning of individual lived experience – or in Husserl's term, "lifeworld"[11] (Husserl, 1970). Disembodiment results in the ignorance of the embodied, subjective and emotional parts of human experience, which are taken as trivial and ordinary. Yet the experience of the ordinary life and trivialities may hold the potential for confronting the flaw of disembodiment. The lifeworld can be generally understood as the lived experience of ordinary everyday life. If so, the learning in this curriculum

[10] This Professor David Carr is the phenomenologist as well as the translator of Husserl's *The crisis of European sciences and transcendental phenomenology* (Evanston, Northwestern University Press), not the educational philosopher.

[11] The term lifeworld is generally used in humanities and social sciences. However, many authors point out that, through Husserl, the term lifeworld enters in the field of philosophy. There may be various interpretations of the concept of lifeworld. However, this thesis takes the lifeworld as synonym of the lived experience. A paper by Hung and Stables (2008) argues that it is an individual and idiosyncratic world of lived experience but not a daily life world common and general for all. The understanding of lifeworld as a personal lifeworld composed of lived experience, in my view, is grounded on the Merleau-Pontian interpretation of Husserl's lifeworld.

seems to be a process of disassociating the pupil and his or her lifeworld because the aim of the curriculum is to teach pupils the scientific knowledge, skills and attitudes --- which have already assumed the naïve naturalistic attitude.

This leads us to think about the meaning of education: if educational activity intends to make the individual's life more creative, interesting and meaningful --- in a word, vivid --- the disembodiment of learning may lead the learner into the opposite direction. The lived experience or the lifeworld is alienated from the individual as a learner because one's lived experience is no more lived authentically and one's lifeworld is no more lived through. The vividness of one's own experience fades away with the disembodiment of the learning process. Therefore, a more worthwhile learning process of nature should incorporate rather than remain apart from the lived experience, viz. the lifeworld. Then, we are invited to ponder upon the following question: how can we bring the vividness back to the educational process? This will be discussed in the next part.

In closing, the discussion of this chapter has already argued that the current curriculum might cause meaning-impoverishment, and that the impoverishment of meaning results from the over-simplifications of what and how to learn about the concept of nature. Therefore the next step may be to think about how to overcome the pitfalls of oversimplification and enrich the meaning of education and life by adopting a meaningful conception of nature in curriculum; but there are many steps along the way. What will happen in the next chapter? Revealing something of the rich range of meanings of nature is the business of the next Part.

PART II

What Kinds of Conception of Nature Could be Educationally Meaningful?

...from nature as the primitive condition before human society; through the sense of an original innocence from which there has been a fall and a curse, requiring redemption; through the special sense of a quality of birth, as in the Latin root; through again the sense of the forms and moulds of nature which can yet, paradoxically, be destroyed by the natural force of thunder; to that simple and persistent form of the personified goddess, Nature herself.

(Raymond Williams, 1980, p. 72)

Introduction of Part II

What kind of view of nature could help to improve and enrich education? What kind of concepts of nature could be taught? There have been numerous discussions on the concept of nature in general literature. The review of the past literature in Chapter 1 reveals that the meaning of the concept of nature is complex, complicated, and significant. It is interwoven with human understanding of reality, the world, deity, knowledge, and both human and non-human beings. Some of the views could be traced back to ancient times, such as nature as becoming, and animistic view of nature; among these ancient views, some are incorporated in modern thought, for example, the atomistic view is accepted and deepened by the modern scientists. In addition, some views of nature may be the responses or reactions to contemporary issues, or more specifically, environmental crisis. For example, deep ecologist view, social ecologist view, social constructionist view, relativist view, and conservationist view can be understood as the theoretical responses to environmental problems from various perspectives. The idea of nature is becoming increasingly contentious and complex rather than clear and distinct. However, the aim of this part is not to solve the debates and decide one perfect definition, but rather to present various views of nature, that might enrich the present impoverished curriculum.

Overall, the previous discussion in Chapter 1 shows that there have been a lot of views of nature and different views are still emerging. It is apparent from the above that there are numerous conceptions of nature that can be utilised for enriching education and life. I summarise the meanings of nature from the previous discussion in the following: a) nature as reality, b) nature as world, c) nature as deity, d) nature as (natural) environment, e) nature as (natural) phenomena, f) nature as criterion of value, g) nature as a characteristic or characteristics distinguishing one from the others, h) nature as the sum of qualities opposite to the man-made, and i) nature as nonhuman beings. However, these meanings do not appear independently. For example, the

concept of nature involved in the human/nature relationship may refer to nature as (natural) environment, nature as nonhuman beings, and nature as human nature. Thematic exploration may help us to gain an in-depth understanding of the concept of nature and its implications for education. Five themes are thus drawn out:

1) Should "nature" be understood as becoming or being? What might be offered by these two views? Which conception could be more educationally meaningful?
2) What kind of conception of the *telos* (purpose) of nature could be helpful for meaningful learning? Should the *telos* be taken as immanent or transcendent? Divine or non-divine?
3) What kind of human attitude towards nature could bring more and richer meaning to education? A disenchanted or enchanted view?
4) What kind of human/nature relationship could be helpful for conceiving more and richer meaning for learning? An anthropocentric or what I will term an anthropo-non-centric view?
5) The above discussions lead us to explore different pedagogical approaches to nature. What kind of pedagogical approach to nature would be significant and desirable? A disengaged or engaged approach?

These themes will invite us to ponder upon the following kinds of question: Should we regard nature as becoming or being? What difference do the two conceptions bring to education? Which polarity could be more educationally meaningful?

It will be argued that these themes are recurrent in different historical times with different shades of meaning; furthermore, their implications cannot be separated distinctively. Now let us have a brief introduction of the five themes.

The first theme originates from metaphysical interrogation of nature: what is nature? What is the composition of nature? What is the origin of nature? How does nature exist? Can nature be divisible? Is there any beginning or end of nature? These questions seem to occupy the ancient thinkers' mind but they never expire. They appear in various metamorphoses. For example, what is the reality of a quantum? Many authors (Copleston, 1966a; Corbeil, 2003) have pointed out that, among the

numerous metaphysical interpretations, the polarities of "becoming" and "being" are the most inspiring and influential ideas not only for philosophy but also for education. These two ideas have been put under discussion since ancient times; however, they are still underpinning the philosophical assumptions of education.

It will be argued that, on the one hand, the idea of nature as being seems more apparent than as becoming in the fields of traditional philosophy and educational ideas. It is incorporated in substance metaphysics, which has taken the reign of the mainstream of metaphysical history and thereby contributed to a large extent to the formation of the over-simplification of our curriculum. On the other hand, the ancient idea of nature as becoming, which is inspiring in many ways, has been relatively overlooked in mainstream intellectual history. Yet the ardent concern for the issue of nature and the stunning findings of natural sciences in recent decades illuminate the significance of process thinking and the consonant idea of nature as becoming.

Metaphysical investigation of nature brings us to pursue the finality of nature, and thereby brings us to the teleological enquiry and our second theme: Does nature have a *telos* (purpose)? Should we regard the *telos* (purpose) of nature as immanent or transcendent? Divine or non-divine? What difference will it make if these different views of nature with different *telos* are brought into education? The changing of conceptions of the *telos* (purpose) of nature cross different thoughts, to a large extent, could be understood as influenced by development of natural science, for example, the Scientific Revolution and evolutionary biology. Following this, we may find that there is a transformation of the relationships between deity, nature and human beings. What change will this transformation point toward in education?

The other themes are in connection with the understanding of the human/nature relationship. The third theme is related to teleology: the religious meaning influences human actions and attitudes towards nature, and *vice versa*. Nature could be worshiped, respected, appreciated, disregarded or exploited dependent upon different views of the human/nature relationship. However, the reflections bring us to our third theme with religious and aesthetic concern: Is nature disenchanted or enchanted, rational or affective? Should nature be treated indifferently or with feelings? Which way will be more beneficial for education and improving our over-simplified curriculum?

The fourth theme explores the meaning of nature from two standpoints: anthropocentric and anthropo-non-centric. Should the human/nature relationship be conceived from the perspective of anthropocentrism or anthropo-non-centrism? Here I propose the pair of polarities of anthropocentrism and anthropo-non-centrism to replace the commonly-used contrast between anthropocentrism and non-anthropocentrism, or anthropocentrism and ecocentrism. With regard to environmental discourses, the term "ecocentrism" is usually taken as a polarity of anthropocentrism. None the less, in my view, it might be misleading to take ecocentrism as the opposite pole of anthropocentrism because it could limit our understanding of anthropocentrism and the possibilities to overcome the shortcoming caused by the anthropocentrism. The idea of anthropo-non-centrism will be defined as a view which acknowledges every human being as a pivot for one's lifeworld without taking the whole humanity as the only centre of meaning in and for the world; this view will be argued to hold potential for illuminating the pitfalls of the current curriculum and pointing towards the way out.

The final theme is about the learning approach to nature: disengaged and engaged approaches. This theme will lead us to elucidate the relationships between the disengaged approach to learning, the collective and anonymous experience and disembodiment on the one hand and, the interrelationships between the engaged approach, body-subject and lifeworld on the other. The elucidation may help us to explore further: What kind of learning process may inspire more and richer meaning for education? A disengaged or engaged approach? The collectively anonymous approach or the individually peculiar approach? A disembodied or embodied approach? It will be argued that the engaged construction is more personally and idiosyncratically meaningful while the disengaged construction is more collectively embedded, viz., culturally or socially dependent. The difference between the engaged and disengaged construction of nature will be made explicit by the discussions of nature as another pair of polarities: space and place. The exploration anchored by the final theme will demonstrate how the disengaged orientation of learning is one important cause of the pitfalls of our curriculum: disembodiment, and therefore the engaged approach may help us to extricate our learning from the pitfalls.

All in all, the idea of nature is an anchor for the exploration of abundant and fecund meanings of living and learning. Peter Coates has stated that "nature, like us, has a history" (1998, p.2). The preliminary overview may suggest that there may not be only one history or story of nature but many. Every approach or interpretation to nature can be understood as a story of nature. For example, Newtonian nature, Einstein's nature, Wordsworth's nature, and Lao Tzu's nature are all different stories. Each of them implies unique insights of the scientist or the poet. The stories and the meanings of nature are still increasing if we attend. They can be taken as sources for us to enrich our currently meaning-impoverished curriculum. Overall, the five themes which are identified above are used to anchor the numerous, various, and complex conceptions of nature. Each theme and its implying polarities will illuminate the significance of human conceptualisation of nature as an on-going dynamic and dialectic process. The following chapters will manifest the heterogeneous and plural views of nature and the abundance of meaning to be had in different ways of experiencing nature in the context of one's unique life.

3

Becoming or Being?

This chapter aims at exploring the meaning and educational implications of nature by focusing on the metaphysical theme of nature as becoming or being. In this chapter, we are led by the following enquiries: Should we regard nature as becoming or being? What difference do the two conceptions bring to education? What educational meanings could these polarities inspire?

Metaphysical discussions on nature have continued since ancient times. These terms ‘nature”, “world”, “cosmos” and “universe” were used interchangeably in the ancient times, so that their meanings are not easy to separate completely (R. G. Collingwood, 1945; F. J. Collingwood, 1960; Copleston, 1966a). Exploration of the ancient view of nature is involved with and inseparable from the view of cosmos, world or universe. The following questions were of greatest concern to the ancient philosophers: Where does the world come from? What is the origin of nature and everything within nature? What is the reality of the world? “Of what is the world ultimately composed?” (Copleston, 1966a, p. 78) In brief, the attempt of the ancient thinkers is to find the final explanation or explanations of nature, world or universe. What is more important for educators is that there are always metaphysical underpinnings of our educational questions, ideas, practices and curriculum. Different metaphysical assumptions may orient us towards different educational questions, theories and practices. For example, educational perennialists, such as Robert Hutchins and Mortimer Adler (1984), claim that curricula should be designed on the basis of common and universal human nature. The elucidation of metaphysical ideas

can help us to make explicit the influences and changes brought to education. The clarification of metaphysical ideas related to nature could shed light on our understanding of the views of nature in the present curriculum.

There might be two metaphysical notions which are the most influential for educational ideas and practices: philosophy of being and philosophy of becoming, or philosophy of stasis and philosophy of flux. These two doctrines can be traced back to ancient times (Copleston, 1966a; Corbeil, 2003). The ancient leading figure concerned with the idea of nature as becoming might be taken as Heraclitus; while the figures aiming at the idea of nature as being include Parmenides and the atomists (Copleston, 1966a). The division of the philosophy of becoming and being actually indicates two different kinds of metaphysics: process metaphysics and substance metaphysics. This thesis does not make rigorously clear-cut distinctions between philosophy of becoming and process metaphysics, philosophy of being and substance metaphysics. Thus philosophy of becoming is taken a synonym of process metaphysics, and the philosophy of being as substance metaphysics, but the categories overlap.

However, it has been mentioned in Chapter 2 that substance metaphysics dominates not only in the field of philosophy.[12] As mentioned above, the partiality towards the dominant view may limit human learning, understanding and imagination. Part 1 has pointed out that the over-simplifications of our present curricula are highly related to substance thinking because the over-simplifications (homogenisation and disembodiment) are interwoven with atomism, mechanism, determinism, rationalisation, standardisation, collectivism and depersonalisation. Substance metaphysics is one of the underpinnings of these thoughts. The relationships interwoven between these thoughts and oversimplification of the current curriculum will be unpicked in Chapters 3 to 7. Hence, the following exploration will reveal that the ancient philosophical ideas might point towards some solutions of the current educational problems. Ancient philosophies of becoming and being are the first source to explore in this chapter.

[12] Substance metaphysics has powerfully dominated the history of ideas even when many contemporary philosophers argue for a non-substance view. There are a number of authors who argue for the stance of substance metaphysics when facing the critiques of process philosophy. See E. J. Nelson (1947) A defense of substance. *The Philosophical Review* 56(5), pp. 491-509. And A. J. Reck (1958) Substance, process and nature. *The Journal of Philosophy* 55(18), pp. 762-772.

3.1 Nature as Becoming

This section aims at exploring Heraclitus' idea of nature and its possible educational implications. We may find that in Heraclitus' view, everything is in flux and he is often regarded as the instigator of philosophy of becoming.

Heraclitus is admitted as a philosopher of ambiguity, or in the terms of a third-century B.C. satirist Timon of Philus, "riddler" (Kirk & Raven, 1957), or in the words of Aristotle, "The Obscure" (Copleston, 1966a; Harris, 1994; Little, 1969).[13] His philosophy is understood by many authors, including Plato and Aristotle, as a representative of a philosophy of flux or becoming or process (Collingwood, 1960; Copleston, 1966a; Corbeil, 2003; Kirk, 1951; Laguna, 1921; Stables, 2007). The idea of becoming distinguishes his view from his contemporaries and other premodern thinkers' views. It also inspires us to reconceive and reflect on our present education which is highly influenced by modern thinking. Heraclitus' view is understood as consonant with contemporary process philosophy; here I do not make sharp distinction between Heraclitus' philosophy of becoming and process philosophy on the metaphysical level.

Furthermore, Heraclitus could be understood as a forerunner of postmodernism; his philosophy anticipates some trends of deconstructive postmodern thinking. On this point, he might give us some clues towards improving (perhaps in a continuous process) the state of our present curricula. This point will be argued later. Now let us investigate Heraclitus's idea in more depth.

Heraclitus is well-known for the sayings: "All things are in a state of flux," and "You cannot step twice into the same river, for fresh waters are ever flowing in upon you" (Copleston, 1966a, p. 39). Plato and Aristotle both remark that Heraclitus' doctrine affirms change as the reality of all things: "All things are in motion, nothing

[13] It is interesting to read the commentary of H. Cherniss (1951, p. 330) about Heraclitus' writing: "…the book of Heraclitus, though written in prose, consisted of a series of apophthegms unconnected by any obviously logical transitions and expressed in an elaborate oracular style. …Such writing is difficult to interpret objectively but easy to quote for one's own purpose, particularly if one selects phrases that sound significant and quotes them without their context".

steadfastly is" (Copleston, 1966a, p. 39). In chief, from Heraclitus's perspective, nature can be understood as changing, flowing and becoming. Even mountains move and rocks can be metamorphous. Some words from his fragments may support this view:

> *It is in changing that things find repose. (Harris, 1994, 23/DK84a)*[14]
> *The sun is…not only new each day, but forever continually new. (Harris, 1994, 36/DK6)*

None the less, many authors point out that it would be a mistake to suppose that Heraclitus admits *nothing but* change. In some respects, Heraclitus' ideas seem contradictory because he admits that all things are flowing and all things are "One". In the fragments, the following description can be found:

> *People do not understand how that which is at variance with itself agrees with itself. There is a harmony in the bending back, as in the case of the bow and the lyre. (Harris, 1994, 11/DK51)*
> *Listening not to me but to the Logos, it is wise to acknowledge that all things are one. (Harris, 1994, 118/DK50)*

A doctrine mixed with pantheism and holism is implied in Heraclitus' ideas. To settle the contradiction in the fragments: on the one hand, all things are in motion; they are continuously renewed, changing and varying. On the other hand, they are one; they are the same; they are unvarying, i.e., they are not changing. Heraclitus attempts to propose the idea of God to solve the problem. First, Heraclitus suggests that nature or universe is God and *vice versa*:

> *The wise is one and only. It is…to be called by the name of Zeus.*

[14] The former figure 23 in 23/ 84a means the number in the edition of W. Harris. The latter figure DK83a, however, represents the number in the Diels-Kranz's numbering system, the most commonly-referred edition of Ancient Greek fragments. Another well-known English version of the fragments in DK numbering system is translated by John Burnet (1912), available online at: http://philoctetes.free.fr/heraclite.pdf .

(Burnet, 1912, DK32)

None the less, the god is not only one god, a universal Reason, one universal Truth and Reality because the idea of one, singular "the" Truth may stifle the tension and the becoming of the world:

> *This world, which is the same for all, no one of gods or men has made; but it was ever, is now and ever shall be an ever-living. (Burnet, 1912, DK30)*

This paradox of "one" and "many" brings about another idea as the referent of deity: the idea of fire which can be perceived as a dialectics of opposites. For Heraclitus, reality is one and the one only exists in the tension or war or strife of the opposites (Coplestona, 1966a). As Heraclitus states:

> *And it is the same thing in us that is quick and dead, awake and asleep, young and old; the former are shifted and become the latter, and the latter in turn are shifted and become the former. (Burnet, 1912, DK88)*

Two points might be found from the above fragments. On the one hand, Heraclitus posits changing or becoming as the reality of the world by claiming that "You cannot step twice into the same river; for fresh waters are flowing upon you" (DK12); on the other hand, he asserts that the unity of the one exists only in the tension of the opposites.

Some authors are skeptical about whether Heraclitus' ideas can be understood as the philosophy of flux (Kirk, 1951). For example, Kirk (1951, p.35) claims that the idea of change is not an idea which Heraclitus particularly stressed. Some (Kirk, 1951; Reinhardt, 1942, cited in Kirk, 1951) deny the idea of becoming in the river-analogy argument.[15] Some (Cherniss, 1951; Kirk, 1951) object that the idea of becoming

[15] According to Reinhardt (1942; cited in Kirk, 1951), Heraclitus did not make a specific analogy between a river and any other thing but only described the general features of a river.

originates from Heraclitus.[16] There is a view that Heraclitus is similar to all the other pre-Socratic philosophers, who are interested in finding the ultimate Reality or, in the terms used by Copleston (1966a), "*Urstoff*" (the primary element) of nature: Thales takes water as the first element; for Anaximander, the four elements including earth, water, air and fire are the basic constituents of nature; for Heraclitus, fire.[17] None the less, Copleston (1966a; Kirk, 1951) points out that Heraclitus does not simply find something different from his predecessors. It seems to me that the idea of fire, for Heraclitus, should not be understood as a universal Reality as his contemporaries pursue, but rather as an activity or a dynamic process. The idea of fire understood as process foreshadows a deconstructive postmodern view of nature and humanity adumbrating a process philosophy of education. As mentioned earlier, postmodernism is a term in a very broad sense referring to a very wide range of notions consisting of deconstruction, nihilism, relativism, anti-foundationalism and anti-essentialism. However, in this thesis, deconstructive postmodernism includes dismantlement and dissection of the old structures and the subsequent building and composition of new ones. Postmodern deconstruction as an on-going process is to a large extent consonant with Heraclitus' idea of becoming as fire. This point will be argued more fully.

Before delving into more educational implications, let us explain the idea of fire not as a universal reality but rather as a process. Popper's acute and interesting interpretation of Heraclitus' idea of fire is worth reading:

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[16] The notion that "all things are in constant change", a concept often taken as a key to understand Heraclitus' thought, as suggested by some authors such as E. Weerts (1931, cited in Kirk, 1951) and Cherniss (1951), might not be first articulated by Heraclitus but by the Eleatic Melissus. For example, the Milesian philosophers including Thales, Anaximander and Anaximenes all derive the world from one single element. This single element is taken, by Thales, as water, by Anaximander, as infinity and by Anaximenes, as air. All things change in the world according to the "rearrangement" of the particular element. The change of things in the world seems to be a "universal recurring periodically". From the view of Anaximander, the change in the world is a repeated process of segregation and reabsorbing; Anaximenes elaborates upon this notion into the "mechanism of condensation-rarefaction" (Cherniss, 1951).

[17] Regarding the idea of fire, Popper (1963a, 1963b) and Kirk (1960, 1961) had different opinions. According to Popper (1963b, p. 144), there is no stability in the world of Heraclitus: "All things are in motion all the time, even though…this escapes our senses". Everything is changing in some respects. Some changes are unclear, but they are. By contrast, Kirk (1960) argues that many things in the world are not changing all the time in human common sense; they may change some of the time. Thus Kirk (1960, p. 334) claims that Heraclitus' fire is "the world-order as a whole" and the world-order is Logos. In chief, Popper holds the view that Heraclitus' change is "in every single physical object", while Kirk asserts "constant change in the world as a whole, with some things having temporary periods of stability" (Kirk, 1960, p. 337). Though not disagreeing totally with Kirk, on this point, I agree more with Popper. There seems to be a danger of totalisation implied in Kirk's interpretation when the constant change and the Logos are both found from the world as a "whole".

> *…there are no solid bodies. Things are not really things, they are processes, they are in flux. They are like fire, like a flame which, though it may have a definite shape, is a process, a stream of matter, a river. All things are flames: fire is the very building material of our world... (Popper, 1963b, 144)*

One very important feature distinguishing Heraclitus' fire from the other *Urstoff* of his predecessors or contemporaries is that the idea of fire is "all things that are, but it is these things in a constant state of tension, of strife, of mutual consuming, of kindling and of going out" (Copleston, 1966a, p. 41). As Heraclitus states, "Fire is want and surfeit" (Burnet, 1912, DK65). Fire designates the state of continuous devouring and dissipating. It is an ever-lasting process of dialectical interaction between opposites, between obliteration and trace-leaving, between destroying and construction. In this light, Heraclitus' idea of fire reminds us of postmodern thinker Jacques Derrida's idea of "deconstruction".

According to Derrida, deconstruction could be understood as a radical act of reading texts but not just as a literary theory of interpretation since every thing could be taken as a signal, sign or text (Bingham, 2008; Hoy, 1979; Nealon, 1992; Zuckert, 1991). There is no decidable or definitive meaning of any sign or text because the meaning of a sign or word is always in relation to the others (senders or receivers of signals) and is context-dependent. The relation of the usage of a sign is not fixed and changes all the time thus meaning is changing, or we may say, becoming. As such, deconstruction is a process which intervenes and questions the established meaning, exposes and breaks the limits and opens up new possibilities. This is a process without particular termination. Therefore, Derrida states, "Deconstruction cannot limit itself…deconstruction will provide itself the means with which to intervene in the field of oppositions that it criticises…" (Margins, 329; cited in Nealon, 1992, p. 1269)

Comparing Heraclitus' idea of fire and Derrida's deconstruction, we will find an interesting consonance between them. As Heraclitus states,

> *Fire lives the death of earth, and air lives the death of fire; water lives*

the death of earth, earth that of water. (Burnet, 1912, DK76)
There is exchange of all things for fire and of fire for all things… (Harris,1994, 28/DK90)

It can be found from the above that fire can be exchanged for all things, because, in a broad sense, all things can be burned down and disappear. Yet the disappearance of the things which have been burned is not absolute --- they are not nullified to zero. To speak in more precise terms, they are metamorphosed and turn into other beings by the fire. In one sense, they are dead because they are not what they were; in another sense, they are regenerated into what they were not. The same happens with "eating": we become "made up" what we eat and of what (and who) we love. The early blob-like amoeba moves about, envelops and absorbs any food which it "encounters". Snakes do much about the same, more purposively. Mouse disappears. Snake becomes "made of" mouse; mouse is reincarnated (resurrected) as "snake". This process resulting in the fire is an on-going dialectic between the opposites, between what is and what is not. The following fragments can give us more clues:

It is one and the same thing to be living and dead, awake or asleep, young or old. The former aspect in each case becomes the latter, and the latter becomes the former, by sudden unexpected reversal. (Harris, 1994, 113/DK88)

We may find that fire as a dynamic process is a pivot for the dialectic of the opposites, i.e. the dialectic of deconstruction and (re)construction. During the on-going process, every thing in nature is becoming, e.g., being born, growing, decaying, dying and renewing. What needs notice is that the dialectic can be understood as a process of varying but not the mere, nor the exact repetition of routine. The meaning of the dialectic can be revealed from the well-known Heraclitus' fragment: "You cannot step twice into the same river; for *fresh* waters are flowing upon you" (Burnet, 1912, DK12). [18] The other translations actually, may make explicit the meaning of

[18] Another English translation of the water-fragment very similar to the Burnet's version, mentioned above, is the translation in Copleston's work: "You cannot step twice into the same river, for fresh waters are ever flowing in upon you" (1966a, p. 39).

heterogeneity of the process. For example, W. Harris' (1994, 20) translation is as follows: "They do not step into the same rivers. It is *other and still other* waters that are flowing". While Kirk (1951, p. 36) translates the fragment into the following sentence: "Upon those who step into the same rivers, *different and different* waters flow". If we go back to the Greek text, the crucial words are "ἕτερα καὶ ἕτερα" (Kirk, 1951, p. 36), which mean "different and different" or "other and other". Viewed in this light, Heraclitus' thoughts can be understood as a philosophy of continuous becoming implying the notion of revealing differences, which is interestingly in tune with deconstructive postmodern thinking.

As mentioned, the notion of deconstruction refers to the ideas of dismantlement and dissection of the old structures and the subsequent building and composition of new ones. Thus, deconstructive postmodern thinking may not only convey to "reveal" differences in the passive sense but also to "make" differences in the active sense. This will be discussed in Chapter 5. The dynamic activity of revealing and making differences is a process of creating. Here we may find that Heraclitus' philosophy does not have direct relation with education, yet his ideas of process of making difference may encourage a creative learning and learning for more creativity and invention.

The terms "create" and "invent" used here are regarded as synonyms. Although the term "creation" is often used to refer to created beings and world from nothing by "God"; the being of the created is brought out *ex nihilo*. However, here we do not interpret this term from a theological perspective but put the emphasis on the respect of human ability to bring out something from nothing: the ability of imagination. Thus "create" and "invent" are regarded as synonyms. "Creation" and "invention" denote the outcome or result; while "creativity" refers to the quality or state of being creative or inventive.

What is highly significant for deriving educational implications from Heraclitus' philosophy is to find the relationships implicit in the ideas of becoming as fire, difference, and creativity. The concept of creativity has been under a large number of investigations ranging across different fields, from psychology to aesthetics. However, here we are focusing on its philosophical meaning rather than the scientific explanation of the psychological procedures of the process of creation. On this ground,

the following authors' views can be referred to:

According to Vincent Tomas (1958, p.4), "To create is to originate. And it follows from this that prior to creation the creator does not foresee what will result from it". Jan Aler (1964, p. 83) defines creativity as "the capacity to produce something new". E. Paul Torrance (cited in Götz, 1981, p. 297) describes creativity as "the process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulties; searching for solutions, making guesses, or formulating hypotheses and possibly modifying and retesting them; and finally communicating the results".

We can find two concordant features between deconstruction and creation. The first one can be found is "originality". Deconstruction and creation both emphasise enfolding, problematisation, interrogation, questioning of established beliefs and practices by creating differences --- something new. The feature of originality can be perceived from the process of producing differences for the process and the result could not be bounded within any established prescription or restriction. Even if some certain goal may be anticipated before or during the process of creating differences, the result would not be definitively secured. What is more important is that there is no exact and precise termination. The second concordance which can thus be revealed between deconstruction and creation is "unpredictability". The feature of unpredictability reveals that the process and the result of deconstruction and creation cannot be strictly regulated and foreseen with precision.

All in all, nature from Heraclitus' perspective could be articulated as a process of becoming and a dialectics of opposites. What is most significant to us is that nature is not merely a world composed of innumerable *Urstoffs* but rather an on-going process, during which differences continuously emerge and evolve. On this ground, we may conclude that, first of all, Heraclitus' idea of flux or becoming is a breakthrough in the tradition of the pre-Socratic Milesian ideas of nature. The Milesian nature is basically a world composed of a particular element and fixed and repeated movements. In contrast, the nature that Heraclitus presents is a world full of various changes and becoming between opposites --- a "dialectical" world..

Furthermore, Heraclitus' philosophy of becoming might invite us to ponder upon philosophy of education from different perspectives. Karl Popper (1963a, p. 386)

has pointed out that Heraclitus' philosophy can be articulated as the following questions: "How is change possible? How can a thing change without losing its identity --- in which case it would be no longer that thing which has changed?" Following this, we may propose some questions of philosophy of education related to Heraclitus' philosophy: If the world and all the things are permanently becoming and changing, then the subject and the object of knowledge are constantly changing. How can learning occur in the flow? How can the learning subject maintain or establish his or her identity? How can a society or a culture be recognised as one if everything is changing? How can people make choices in a continuously changing world? Furthermore, according to Heraclitus' water fragment, the world is different from how it appears. How different can the world and everything be? How different can people be and learn to be? And can education itself be "different" conceptually?

In some sense, Heraclitus' view seems "unnatural". The world that we experience everyday seems stable and static to some extent. The natural landscapes, mountains, fields and plants seem to keep their appearances. Even animals do not move all the time. If physiological growth is a certain part of change of animals, it cannot be obviously perceived in our experience. Overall, natural environments and living beings seem to change in such a very slow way that it is hardly perceived. Thus Heraclitus' view seems inappropriate to be taken as a reference for orienting education.

However, as a sympathiser of Heraclitus, I agree that human beings do not experience the world "as" drastically changing. Yet our experience of the world may be analysed, interpreted and conceptualised from different perspectives. From a macroscopic view, the world that we experience is quite steady and stable. But if we take a microscopic perspective, everything is continuously changing. For example, on the level of molecules, successive chemical reactions keep occurring in the cells of organisms. They are continuously producing and multiplying themselves by dividing, decaying, and being recycled. To take a view on the social aspect, every individual can be analogised as a cell. Thus the change of a group or society may take time to effect. Yet viewed on the individual aspect, every living person is undertaking a lot of changes such as making decision and acting. A lot of differences on the microscopic level will consummate with change on the macroscopic level. Viewed in this light, Heraclitus' view is insightful for being attentive and sensitive to tiny changes which

have big consequences.

Mashalidis, furthermore, proposes five points related to education, which are inspired by Heraclitus: (1) educators need a holistic and integrated cosmological vision of reality as a basis for conceptualizing curriculum, ideas, theories and practices; (2) Heraclitus' idea fosters an understanding of the complex relations between different aspects of knowledge; (3) the educational process must be grounded on a broad, inclusive and dynamic epistemological and metaphysical worldview; (4) the doctrine of opposites contains an implicit notion of creativity; (5) Heraclitus provides a rationale for examining the organic process of school change and renewal (Mashalidis, 2003, pp. 28-32).

Drawing on Heraclitus' and Popper's ideas, Mashalidis (2003, p. 28) describes that "there are no unchanging things and that the apparent stability of things, or even of the entire universe, can be explained as a set of law-like, measured processes in perceptively visible or imperceptibly invisible flux". According to Mashalidis, there is nothing unchanging in the context of Heraclitus, thus there is no stable reality of things for us to know. In this case, knowledge about nature is a set or sets of ideas related to a law-like or, in looser terms, regularity-like, dynamic process. Our descriptions have to be more like a four-dimensional "movie", not like a "snapshot". Then, one point that may be very significant to education but ignored here is how human beings with their changing human nature grasp the regularity-like knowledge through the flux. This answer, in my opinion, can be found from phenomenology, which will be explored in the third part. Here we may find that a picture concerning education adumbrated by an ancient philosopher may be painted by contemporaries.

All in all, Heraclitus may not propose a complete and coherent philosophy of education, yet what he left us are very rich, potential and precious ideas. Firstly, we may find that the philosophy of becoming seems to be relatively overlooked in comparison with the philosophy of being. Secondly, this ignorance might last for centuries until late 19th century, the time of the advents of evolutionary biology, postmodern philosophy and postmodern sciences (or new physics). These 'post'modern developments encourage us to take the ancient Heraclitus' insightful ideas seriously again and invite us to rethink their significance for our present education.

3.2 Nature as Being

In addition to the notion of becoming, another influential legacy of ancient philosophers is the philosophy of being. The following discussion of this section will elaborate the view of nature as being in ancient thought and its implications for education nowadays. The doctrines of Parmenides and the ancient atomists are taken as the targets for investigation.

In contrast with Heraclitus' idea that all things are becoming, Parmenides asserts that "being is" and "becoming is illusory". Parmenides is well-known as a philosopher of "being" or "what is" or "one" (Barnes, 1979; Collingwood, 1960; Copleston, 1966a). Parmenides differentiates thought from its objects, sensation from its objects. This differentiation, as pointed out by many authors (Copleston, 1966a; Rees, 1954), is adopted by Plato, probably in part[19], and becomes influential for the later history of philosophy and educational thought. In general, two points in Parmenides' thoughts need notice: one is the idea of One or "what is"; the other is the distinction between "the way of 'what is'" and "the way of 'what is not'".

Parmenides in his fragments enunciates that what he aims to pursue is truth, and truth *is*. However, for human beings, there are two paths of learning: one is directed to truth; the other is directed to illusion. Here we may find a prototype of epistemological dualism: truth vs. illusion. Moreover, the proto-epistemological dualism is grounded on a deeper proto-metaphysical dualism: being vs. not being (or non-being). As Parmenides (Burnet, 1920) states:

> --- *the only two ways of search that can be thought of. The first, namely, that* ***It is****, and that that it is impossible for it not to be, is the way of*

[19] Rees (1954) agrees that there is a direct relation between Plato's distinction of knowledge and opinion and Parmenides' differentiation of thought and sensation; however, Copleston (1966) is doubtful about this view but he does not deny that Parmenides might have some influence on Plato's thought.

> *belief, for truth is its companion. The other, namely, that* ***It is not****, and that it must need not be, --- that, I tell thee, is a path that none can learn of at all.*

The "truth", "what is", the "being" or the "one", according to Parmenides, implies four characteristics: it is "uncreated and indestructible", "complete" (or "indivisible"), "immovable" and "without end" (Burnet, 1920). Viewed from the educational aspect, Parmenides seems to suggest that the most valuable knowledge, that is worth learning and teaching, is the absolute, universal and objective "Truth" that is complete, immovable and indestructible.

What are the characteristics of the *what is* or Truth? For the "what is", there is neither origin nor end; it is ingenerate and imperishable (Schick, 1965). Copleston gives a very clear explanation on this point that "if something comes into being, it must arise either out of being or out of not-being. If it arises out of being, then there is no real arising, no coming-to-be; for if it comes out of being, it already is. If, however, it arises out of not-being, then not-being must be already something, in order for being to be able to arise out of it" (1966a, p. 50).

Next, "what is" is "complete"; It cannot be more or less; *what is* is, and cannot be divided by nothing or it cannot be *what is* is. It is an indivisible whole. Therefore, the completeness is related to its immovability. The "immovable" of *what is* designates motionless and unchanging. *What is* cannot be added or divided by something other than itself; it cannot be influenced by any other things ---- there is no other being except *what is* and *what is* has already been and will be, in Parmenides' notion. In this sense, all changes and movements are impossible. The discussion above seems to suggest Platonic idealism in approaching the *what is* as the most absolute and abstract idea. However, the following interpretation shows that Parmenides' view might be equally validly construed as the opposite: materialism.

Since *what is* is endless or infinite temporarily, "having neither beginning nor end" (Copleston, 1966a, p.50), it is infinite spatially and temporarily. Many commentators agree on this point that the being or *what is* is a "finite, spherical, motionless corporeal plenum" (Burnet, 1920; Copleston, 1966a; Schick, 1965) because the incorporeal is unknown and cannot be described (Kirk & Raven, 1957).

Accordingly, *what is* is material. As Parmenides states in the fragments:

> *It is the same, and it rests in the self-same place, abiding in itself. And thus it remaineth constant in its place; for hard necessity keeps it in the bonds of the limit that holds it fast on every side. Wherefore it is not permitted to what is to be infinite; for it is in need of nothing; while, if it were infinite, it would stand in need of everything. (Burnet, 1920)*

Viewed in this light, *what is* must be material, thus Burnet (1920) calls Parmenides "the father of materialism" rather than "the father of idealism". None the less, Parmenides' doctrine about the above features of *what is* and his differentiation between the path of *what is* or truth and the path of *what is not* or not-being may contain the germs of idealism, materialism, atomism and dualism.

Many authors are in accord on the point that Parmenides' insistence on the unchangeability of the *what is* is adopted by Plato and turns into an everlasting, immortal and objective idea (Copleston, 1966a; Rees, 1954). Viewed in this light, Parmenides could be called "the father of idealism". However, if judged by the content of doctrine, Parmenides is indeed a materialist. His notion of *what is* as indestructible and indivisible material is actually found in the doctrine of the materialistic atomists like Empedocles and Democritus. Thus the atomists are Parmenides' true descendants or in Copleston's words, his "legitimate children" (1966a, p. 52). The possibilities of idealism and materialism implied in Parmenides' thought can be found and thereby a dualism is suggested.

Ontological and epistemological dualisms are both implied in Parmenides' thought. The ontological dualism is related to the distinction of idealism and materialism/realism, while the epistemological dualism is connected to the ways of truth and of illusion. The former focuses on the reality of the world, or "what to know", the latter on the way of learning and knowing or "how to know". Parmenides himself declares a materialistic monism but, paradoxically, his argument may imply the opposite. Viewed in this light, dualist thought, traditionally taken as the legacy of Plato, may be traced back to the pre-Socratics.

There might be difficulty in education if we take Parmenides' dualist path: first

of all, it may be too simple to divide knowledge or learning into the two polarised types: absolute truth and complete falsehood or illusion. However, there are various kinds of knowledge, e.g. cognitive, functional, emotional, communicative, and so forth. Can all kinds of knowledge be simply classified as truth and illusion? It is obvious that the clear-cut "absolute" categorisation is not suitable for some knowledge such as knowledge in relation to ethics and aesthetics.

Moreover, the either/or perspective of knowledge assumes the absoluteness, objectivity and universality of truth and the standardisation of learning. Who and where can people learn the absolute truth (the truth, the whole truth, and nothing but the truth)? An ethical or political danger could be produced by this view: determinism, totalisation and authoritarianism. Belief in "One" or "Truth" easily turns into trust of a particular person who could bring us to the "One" or Truth". It is probable that this person turns into an unchallengeable authority, such as an infallible pope, priest, shaman. This danger of authoritarianism implied in the pursuit of "One" or "Truth" can be found in both Western and non-Western cultures. In ancient China, the emperor, as the political supreme authority, is also named "son of god", symbolising the incarnation of "One". Moreover, Confucius, founder of Confucianism which is the most influential ethical and philosophical system in Chinese cultural traditions, is dubbed as "the Greatest Teacher". Confucianism has dominated the intellectual tradition for more than two thousand years and has been the only officially acknowledged and endorsed doctrine for learning and imperial examinations during that period of time. However, the instances above show that despotism may be led by authoritarianism which could be legitimised by the ideology of totalisation. When people enforce the Truth that they believe, totalisation is implied because the other ways of thinking are ruled out. Moreover, when the enforcement of the so-called "Truth" is taken as a certain "vocation", that Truth must be known by all because it is good, it is easy for believers to adopt coercive means. And here comes the threat of totalitarianism.

The belief in "One" or "Truth" or "what is" in education implies the notions of normalisation and standardisation which are expressed as the requirements, criteria and regulations in order make "objective" assessment and evaluation of pupils and educators. None the less, to assess people is, indeed, to mark, compare, rank and

arrange people. Implied in this view is the assumption of the idea of being which takes the world and human nature as stable, fixed and homogeneous so that they are commensurable and comparable. On this view, we may find a reciprocity between Parmenides' and the atomists' philosophies.

The dualist notions of Parmenides are therefore consonant with those of ancient atomists, such as Leucippus and Democritus. Although Democritus could be Socrates' contemporary, here his ideas are taken into discussions of the pre-Socratics. Owing to the relationship between Parmenides and the ancient atomist doctrines, Leucippus' and Democritus' philosophy is included in the discussion.[20] We may find that Parmenides and the atomists have different contributions to the philosophy of being or substance metaphysics. Parmenides initiates dualism while the atomists initiate mechanism.

According to Aristotle and Cicero, Leucippus is considered as the inventor and Democritus as the elaborator of atomism (Kirk & Raven, 1957).[21] From the perspective of Copleston (1966a), atomism is seen as a logical development of Empedocles' attempts to reconcile Parmenides' immovable being and non-being through a "thorough-going mechanism". According to Popper (1963b), atomism synthesizes Heraclitus' theory of change and Parmenides' notion of the indivisible unit --- the one. If this is the case, why is atomism taken as a part of philosophy of being? The answer could be that atomists including Leucippus and Democritus explain the world and nature in terms of mechanical materialism. According to the limited extant records (Berryman, 2004a, 2004b, 2005; Burnet, 1920; Copleston, 1966a), the world is composed of physical atoms or particles that are uncuttable,

[20] There are different views about the origin of atomism. Some authors, such as Burnet (1920) and Zeller (Benn, 1911), take atomism as "antithetical doctrines" from the Eleatic Scholars, such as Parmenides. In this view, atomism is in some respects in conflict with the view of Parmenides. Some authors such as Benn (1911) and Copleston (1966a) consider atomism affiliated with the natural philosophy of Miletus and Elea. In this sense, atomism could be understood as derivative of the pre-Socratic predecessors. Some authors group atomism as one branch of Pythagorean, such as Bury (1916). However, the genealogical study of the origin of atomism is not the aim of the thesis. But what cannot be denied is that atomism is inevitably related to the doctrines of Parmenides, be it agreeable or oppositional. On the problem related to the relation between atomism and its predecessors, we agree with the view of Copleston (1966a) and Popper (1963a, 1963b) that Heraclitus and Parmenides prepare for atomism in different aspects because the connection between them is significant for the formation of atomist view of nature.

[21] The works of Leucippus and Democritus do not survive in the original. The existence of Leucippus has been called in question. The most instructive reports of Leucippus and Democritus are those by Aristotle, and most of them refer to Democritus or both together (Berryman, 2004a, 2004b, 2005; Burnet, 1920).

unbreakable or indivisible; the changes in the world are caused by the rearrangement of clusters of atoms. “The atoms differ from each other, not in matter, but only in arrangement and shape: all ‘qualitative’ differences in objects (which are conglomerates of atoms), therefore, are dependent on quantitative and local differences alone” (Kirk & Raven, 1957, p. 408).

Although the atomists’ doctrine may, as mentioned, be influenced by Parmenides, there are differences between them. As stated by the author Theophrastus in the third-century B.C., Parmenides “made the All one, immovable, uncreated and finite, and did not even permit us to search for *what is not*” (cited in Burnet, 1920). By contrast, the ancient atomist Leucippus “assumed innumerable and ever-moving elements, namely, the atoms. And he made their forms infinite in number, since there was no reason why they should be of one kind rather than another, and because he saw that there was unceasing becoming and change in things” (cited in Burnet, 1920). What is interesting is that he held the view that

> *...**what is** is no more real than **what is not**, and that both are alike causes of the things that come into being; for he (Leucippus) laid down that the substance of the atoms was compact and full, and he called them **what is**, while they move in the void which he called **what is not**, but affirmed to be just as real as **what is**. (Theophrastus, cited in Burnet, 1920)*

The atomist world is accordingly composed of *what is* ---atoms--- and *what is not* ---void. Kirk and Raven (1957, p. 408) point out that the idea of “void” cannot be understood as “space” because the atomists “had no conception of bodies occupying space; and for them the void only exists where atoms are, that is, it forms the gaps between them”. In the view of the ancient atomists, the world is materialistic. The idea of nature as being is accomplished by adopting and transforming Parmenides’ immovable one into innumerable many (atoms); however, be it one or many, they are all homogeneous. As mentioned, there are no qualitative differences between the atoms, only quantitative differences between the clusters of atoms. On this ground, a homogenised materialistic epistemology and mind-body view can be found in the

ancient atomist accounts. Firstly, the mind is taken by the atomists as the concentration of mind- or soul-atoms and secondly, thought is a process similar to sensation. As reported by the 1st century B.C. author Aetius and the 3rd century B.C. author Theophrastus, the early Greek atomists "say that perception and thought arise when images enter from outside…", for example, "the visual image does arise directly in the pupil, but the air between the eye and the object of sight is contracted and stamped by the object seen and the seer…" (cited in Kirk & Raven, 1957, p.421). In sum, the atomist explanation of the sensation is that the senses are the effects of different shapes and sizes of atoms (Kirk & Raven, 1957, p.423).

It can be found that the view of nature presented by the ancient philosophers of being --- Parmenides and the atomists --- encourages conceptions of mechanism, homogenisation and determinism. Nature in the view of the atomists is composed of innumerable and indivisible material atoms or particles. According to Aetius, Leucippus states that "nothing occurs at random, but everything for a reason and by necessity" (cited in Kirk & Raven 1957, p. 413). The notion that everything and every movement are pre-decided for a particular reason obviously implies the notions of teleology, determinism, causality and mechanism. According to these notions, the truth of all beings and their movements in nature are regulated and decided by deity. This might hint at "teleology": all existences and movements in the world are destined to occur in an inescapably necessary and particular way. The philosophy of being might be radicalised as extreme determinism or fatalism, whereby there is no free will or freedom at all in nature. The relationship between philosophy of being and teleology will be discussed in the next chapter.

A threat to education could result from the reification of the idea of not-being or negativity. There is no possibility to escape the omnipotent and omnipresent "being" because there is only "being" and no "not-being". In the doctrines of Parmenides two ways towards knowledge can be found: one towards truth, the other towards illusion. This epistemological dualism does not imply the ontological reality of illusion or not-being because not-being could not *be* for Parmenides. The odd dualist thinking in the atomists may lead towards materialistic monism. However, the coercion of this view implies an all-embracing absolutism, totalism or totalitarianism. The existence of the void is admitted by the atomists, but it is understood as something substantial, some

kind of real stuff, named the void. Furthermore, the idea of monism is clearly shown from Parmenides' notion of the One. However, it seems to be contentious to group the idea of atom in the class of monism. According to the atomist doctrine, atoms are innumerable in quantity and "all atoms are exactly alike in substance" (Burnet, 1920). In other words, these many atoms are all similar to each other; they are homogeneous. From the view of the ancient atomists, "if there were a plurality, things would have to be of just the same nature as the one" (cited in Kirk & Raven, 1957, p. 304, p. 405). The absolute "one" and the absolute "many" seem to be extremely opposite but qualitatively equivalent. Thus, atomism in this sense strongly shows the tendency of totalitarianism and terrorism by its potential implications of homogenisation, determinism and collectivism. This view could contribute to the predicaments of our present curricula.

The point related to education drawn from the philosophy of being (and atomism) may be the fixed, mechanical and predictable approach to educational ideas and practices on the basis of a mechanical and static perspective on nature, knowledge, humanity, and society. The argument is as follows. Since the idea of being is regarded as atom as substance, every atom is homogeneous in quality and thus is pre-determined, commensurable, comparable, predictable and, finally, controllable. Nature, society and the members of nature and society are composed by the homogeneous atoms; therefore, the collectivities have the features of atoms: stable, static, predictable and controllable. Viewed in this light, there are particular and normative aims, objectives, structures and means of education and curricula for learning under the guidance of "One" or "Truth".

On this ground, we may conceive a possible picture of educational practices: a set or sets of educational norms should be devised for application and implementation according to the proper route; every person has a particular and fixed social role or status and should be appropriately educated for performing her duty well. This educational picture could be found in many traditional societies, e.g. ancient China mentioned above and ancient Greek city-states (or *polis*). The fixed reality of humanity may give legitimacy to the fixed social role and duty and to a static hierarchical society lacking social fluidity. In some respects, totalitarianism can find support in philosophy of being: Parmenides' idea of "one" or "what is" justifies the

authority from the macro perspective; atomists' concept of "many" perhaps supports the submissiveness of every being from the micro perspective.

3.3 Summary

All in all, the ancient views of nature or of reality have been very influential on intellectual and educational ideas and practices in the past. The philosophies of becoming and being, implicitly or explicitly, are still underpinning our educational thinking. What difference could these two conceptions bring to education?

On the one hand, the philosophy of being has been argued to be highly related to the notion of homogenisation and thereby results in the dangers of determinism, totalisation, authoritarianism and collectivism. In this light, philosophy of being in this thesis is understood in a restricted sense as substance metaphysics rather than in the sense of Whitehead's philosophy or Prigogine's thought.[22] This point shows that the philosophy of being could be a stimulus for the pitfalls of our present curricula. The explorations in the following chapters will demonstrate that the philosophy of being is beneficial for establishing a view of nature with divine *telos*, and a disenchanted view of nature, which might help to fortify the oversimplifications of our current curricula. This concept of nature as being plays a very important role on the stage of intellectual thought and therefore has a great influence on education. In some sense, it seems that human intellectual activity is, as Nietzsche stated, a movement driven by the will to truth. From this perspective, a fixed, static and predictable "Truth" could be possibly approached by measurable and mechanical

[22] From the perspective of process philosopher Whitehead (1979), the basic metaphysical category, in his term, the actual occasion, is not substance but a process of becoming. Substance and becoming can be understood as different types of being (Levi, 1958). Moreover, according to thermodynamic scientist Prigogine, "Being and Becoming are not to be opposed one to the other: they express two related aspects of reality" (Prigogine & Stengers, 1985, p. 310). Moreover, "[w]e are living in a dangerous world that inspires no blind confidence, but perhaps the…feeling of…hope…" (Prigogine & Stengers, 1985, p. 313). In their view, "substance" and "process" are opposite realities; the ontological positions of substances metaphysics and process philosophy are distinctively different. This thesis uses philosophy of being to refer to substance metaphysics while philosophy of becoming relates to process philosophy.

procedures. Concerning metaphysics, the view of nature as being, on the one hand, implies the ideas of harmony and order; on the other hand, it may bring about the ideas of stillness and death. Regarding epistemology, this view suggests that this world is "One" and "Truth". Thus knowledge of the world can be accessed and discovered by a proper and correct way. "Correct" and "standard" knowledge can be learned by "proper" arrangement. On the cultural and sociopolitical level, this view assumes the idea of fixed human reality and social conditions and could lead to the traps of homogenisation, determinism, authoritarianism, totalisation and collectivism. Thus understood, philosophy of being is deeply influential on our present educational predicament.

On the other hand, the discussions above reveal that philosophy of becoming may be insightful for improving our present educational predicament. This view has potential for conceiving continuously changing metaphysical reality, unpredictable social changes and capricious human nature and nature itself. What is more interesting is that it anticipates contemporary postmodern notions. It is beneficial for educators to conceive the learning process as a dynamics of challenging the established orthodoxies by creating differences. Yet this view seems to suggest risky learning; what and how people learn cannot be cannot be definitively ascertained because there is no absolute standard and norm. The view of becoming seems risky. None the less, it could be full of possibility. In Heraclitus's view, nature is becoming; everything in and by nature keeps changing and becomes "different and different". It seems a challenge to take this view as a motto of education because there is no definite order, rule, regulation and law to obey.

The investigation above illuminates the difference which the two conceptions of nature could make. Now we are brought back to our questions: Should we regard nature as becoming or being? Which polarity could be more educationally meaningful?

The ancient philosophies of becoming and being propose very different metaphysical outlines of nature and human beings for envisaging educational ideas and practices. In my view, Parmenides and the atomists' philosophy of being denotes the possibility of supporting a static, measurable and standard learning model entailing dangers of determinism, collectivism, totalisation and homogenisation. A reliable, stable and secure approach to learning might be brought about. Yet this view

could impoverish the dynamic meanings in living and learning. It is not a desirable life or education. Such a meaning-impoverished life or education is not desirable. Rather, living and learning might be seen as a journey towards the unknown, as essentially adventurous. “Knowing nothing; explore everything” might be its motivating motto. Completely safe learning and living is an illusion and easily to be taken as a pretext for dictatorship, security, certainty, ossifying orthodoxy. In contrast, Heraclitus’ philosophy of becoming implies the possibility of conceiving a dynamic learning process that may allow more space for heterogeneity by taking the risk of insecurity and adventure. The most significantly educational point on this view is that learning and living is always a risky adventure.

On this ground, we may conclude with a reply to the question above: Heraclitus’ approach to nature as becoming might bring more potential to improve the current unbalanced curriculum and thereby bring more abundant meanings for our lives, educational ideas and practices than a view of nature as being which has been heavily emphasised in education up to now.

4

Telos of Nature?
Immanent or Transcendent?
Divine or Non-divine?

This chapter aims to explore the meanings of nature and the educational implications which are anchored by the theme of the *telos* of nature. Following the metaphysical exploration of reality of nature, some questions have always been asked: What is the *telos* (purpose) of nature? What is nature all about? What can the *telos* (purpose) of nature bring to our life and education? The study of the purpose of nature has a long history. Many conceptions of the *telos* (purpose) of nature have been conceived; then, what kind of the conception might be most helpful for education?

For ancient people, the existence of living-beings within nature seems to be one of the convincing proofs that is used to demonstrate the existence of a divine creator or a purposeful creation (Glacken, 1967). Hence in ancient times, the idea of *telos* is taken as a divine purpose which is bestowed by a deity or deities. Since nature is regarded as a living world --- everything in nature is taken as alive --- thus the *telos* can be understood as immanent animus or souls. In addition, the *telos* is conferred by deity or deities and so is divine.

There are two features of the ancient study of divine *telos.* First, the study of teleology is inseparable from theology because the discussion of ancient teleology focuses on the supernatural creator deity presumed to have created nature for "his" purpose. Secondly, the study of ancient teleology is inextricable from that of animism.

The combination of both studies forms the basic content of physico-theology. As Morito points out, teleology and animism are the most important ideas of the view of nature in ancient Greece. A similar perspective can be found in Glacken's thought. Glacken (1967) points out that the most important ideas for understanding nature are those of order and purpose in the universe and on earth. Many authors agree that an animistic view of nature with divine *telos* could be taken as representative of the ancient view about natural purpose. Plato and Aristotle, undoubtedly, as two of the most prominent and influential ancient Greek philosophers, argue for a physico-theological nature. Their views were hugely influential on the subsequent natural theology and natural philosophy of the Middle Ages. This chapter will focus on their conceptions of *telos* in nature.

The ancient conception of a *telos* of nature has been critically challenged in modern times. The term "modern times" here is used in the broad sense to describe the post-medieval times, loosely referring to the period from the end of the 15th century to the early 20th century. However, many ancient and medieval ideas about nature have been put under rigorous examination during the Scientific Revolution, including the notions of teleology and animism. One of the aims of the Scientific Revolution was to pursue the truth of nature by developing scientific methods and tools. The scientific methods and tools are used to secure standardisation of the process of acquiring knowledge and the outcome. This process is to establish "Science" as a rigorous and autonomous discipline with strict criteria of scientific method and knowledge. The ancient, animistic and teleological view of nature seems unqualified to meet the requirements of "Science". One of the tasks of the Scientific Revolution is thus to take a more "scientific" view to replace the "unscientific" animistic view. This scientific view tends to be essentially mechanistic.

During this process of turning the animistic nature into a mechanistic one, a number of thinkers such as Galileo, Bacon, Hume and Kant make prominent contributions. This process can be divided into two steps: the rejection of physico-theology and the development of scientific criteria. The first step is discussed in this chapter; the second in Chapter 5.[23] The rejection of physico-theology is significant for

[23] Both steps indeed in a broad sense can be included under the theme of "disenchantment vs. enchantment". However, this thesis will argue for a more specific definition for the theme "disenchantment vs. enchantment", which is understood from a secular perspective.

shaping different understanding of the meaning of *telos* of nature: a divine and transcendent *telos* of nature. The Enlightenment philosophers Hume and Kant both propose important arguments against physico-theology. Their successful rejection of the idea of purposeful nature is beneficial for the establishment of a mechanistic view of nature. Hume's and Kant's arguments will be explored.

The concept of nature with immanent *telos* reappears due to the advent of evolutionary biology. However, the meaning of the *telos* of nature in modern biology is different from that in ancient times and the Scientific Revolution. It is an immanent non-divine *telos.* The concept of nature implied with non-divine *telos* points towards a new teleology which reveals a perspective of an end (or ends) immanent in material and organic nature. This view will be discussed in the third section of this chapter.

Three main conceptions of *telos* in nature will be explicated in the following paragraphs. What educational implications can we infer from these three conceptions: nature with divine *telos*, nature without divine *telos*, or nature with non-divine *telos?* What kind of conception might be most helpful for education? The educational implications will be explored in two points. The first is related to human/nature/deity relationships. It will be demonstrated that the view of nature with divine *telos* leads towards a hierarchical view of beings; while the view of nature with non-divine *telos* holds more potential for an egalitarian relationship between human beings and nature. This point will be extended in Chapter 6. The second point is about determinism. It will be argued that the transcendental-divine and immanent-divine concepts of *telos* of nature may lead to the danger of determinism; however, the concept of immanent non-divine *telos* might imply more possibilities to extricate ourselves from this bane. This difference may be due to their different metaphysical assumptions which are grounded separately on the philosophies of being and of becoming.

4.1 Nature with Immanent Divine *Telos*: Physico-theological View of Nature

This section aims to make explicit the senses of the ancient view of nature in relation to the idea of *telos*. In general, there is a conspicuous feature of the ancient view of nature, which is a "nature with divine *telos*" or "nature with divine purpose". The speculations on nature and on God are often inseparable in ancient times. Plato and Aristotle, undoubtedly, are two of the most prominent and influential philosophers among the ancient thinkers. Their views of nature are taken as the foci.

4.1.1 Plato's view

Let us now take Plato as the starting point of our exploration of the view of nature with purpose. As many authors have mentioned, ancient Greek cosmology and theology are inseparable (Collingwood, 1945; Collingwood, 1960; Copleston, 1966a). Plato's view of nature is mainly about the story of the formation of cosmos and can be found basically in *Timaeus*. As one of Plato's late dialogues, it has been taken by many authors as one of Plato's works implying the most significant notions on nature or cosmology (Collingwood, 1945; Glacken, 1967; Lee, 1965; Morito, 2002; Soper, 1995). In this story of the formation of the universe, a maker or a god as the intelligent origin of all things, named Demiurge, appears. In order to explore Plato's view of nature, let us put the main focus on the *Timaeus*. Plato's perspective of nature in this dialogue can be understood as a nature with immanent divine purpose or *telos*.

Three main points about Palto's view of natural teleology can be identified from *Timaeus*: 1) As the world-creator or the artisan-deity, Demiurge bestows *telos* on nature; 2) a dualist world scheme is proposed as the bridge between nature and human nature and 3) nature is an animistic world which is full of *telos* as well as souls. The three points, on the on hand, distinguishe Plato's view from the pre-Socratics'; on the other hand, they demonstrate the transforming connection between both.

First of all, in *Timaeus* (Plato, 1965), the centre of the discussion is put on the creation of the cosmos and the world-creator: Demiurge. However, what needs to be noticed is that the "creation" is different from the Christian creation denoting creation *ex nihilo*, out of nothing. Demiurge is more like an intelligent and skilful designer; he can create order and beauty out of rough material. What is more, he can control nature.

Plato describes the god with different titles such as father, maker, craftsman, artisan deity and the world-creator. The world is not merely a simple reproduction but rather the work of the deliberate and careful activity of an intelligent and good artisan deity (Glacken, 1967; Lee, 1965; Plato, 1965). As mentioned, Demiurge as the world-creator and the artisan-deity is no God in the Judeo-Christian context. Demiurge's making is different from the creation of Judeo-Christian God --- or in the terms of Copleston (1966a), the Creator-God (Collingwood, 1945). The Judeo-Christian religion takes the world is a "creation out of nothing" (*creatio ex nihilo*) by God. In contrast, the ancient Greek deity cannot "create out of nothing" (*ex nihilo nihil*).[24] Demiurge combines and processes the elements of world which has existed. Furthermore, the work or creation of Demiurge is modeled from the ideal; his work made upon the natural world is only temporal and changeable. As Plato (1965, p. 40) states, "the maker of anything keeps his eye on the eternally unchanging and uses it as his pattern for the form and function of his product…" It can be found that Demiurge himself is not totally identified as the "eternally unchanging", although he may partake of the eternal good.

It can be found that Plato's description about Demiurge is ambiguous; according to many authors, at least three interpretations have been proposed to elucidate the meaning of Demiurge: demiurge as a personal deity, or as a symbol of intelligent causation or as a doublet of world soul (Robinson, 1967). However, this thesis does not intend to solve this ambiguity; what matters for present purposes is that, whether Demiurge is a personal deity or a symbol or a doublet of world soul, he is the one who brings souls into the world, the one "who, imitating an unchanging and eternal model, imposes mathematical order on a preexistent chaos to generate the ordered cosmos (*Kosmos*)" (Zeyl, 2005). In other words, the disordered chaos is bestowed with *telos* which regulates and normalises the direction of the movements of all beings in nature and thereby begets an orderly world.

Secondly, a dualist world scheme is proposed as the bridge between nature and human nature. The physical world in Plato's view is changeable, corporeal, visible and tangible, and contains four material elements (water, air, fire and earth). Demiurge

[24] George Boas (1936) pointed out one of assumptions of the Greek philosophy is "*ex nihilo nihil*". As written by Aristotle in *De Caelo*, "For it is possible for one body to be generated out of another…but it is impossible for a body to be generated from no other pre-existing corporeal quantity".

places and arranges the four elements in accordance with proper proportions. The proper proportions can be understood as forms or ideas or *telos*. A two-world scheme or dualist metaphysics can be found here. As Timaeus says,

> *We must in my opinion begin by distinguishing between that which always is and never becomes from that which is always becoming but never is. The one is apprehensible by intelligence with the aid of reason, being eternally the same, the other is object of opinion and irrational sensation, coming to be, but never fully real……As for the world --- call it that or cosmos or any other name acceptable to it…for it is visible, tangible, and corporeal, and therefore perceptible by the senses, and, as we saw, sensible things are objects of opinion and sensation and therefore change and come into being. [Timaeus, 28]*
> *（Plato, 1965, p.40）*

According to this two-world schema, or dualist metaphysics, the physical world is fashioned by the artisan-deity into "a single complete whole, consisting of parts that are whole" (Plato, 1965, p.44). The artisan deity brings forth the world and all creatures by arranging and composing four elementary constituents, viz. earth, water, fire and air according to various proper proportions. The difference in proportions denote to forms or ideas. According to Plato, the god found that the physical and visible world was "in a state not of rest but of inharmonious and disorderly motion" (Plato, 1965, p.42). Demiurge "reduced it to order from disorder" because he judged that "order was in every way better" (Plato, 1965, p.42). There is an ideal world of intelligence, order and harmony for the physical world to model. The dualist idea can be clearly found in Plato's famous cave allegory in the *Republic*. There is an interesting parallel between the *Republic* and the *Timaeus*: in the *Republic* an isomorphism between three parts of soul and three classes of city-state can be found and so can one in the *Timaeus* between the structure of world-soul and the structure of rational soul (Betegh, 2004). Plato (1955), through Socrates' mouth, presents a story about a group of cave prisoners and two worlds: one is an underground chamber like a cave; the other is the upper world outside the cave and is open to the sunlight. In the

best-known sense, the cave represents the visible world where everything is changeable, shifting and mortal; the world under the daylight represents the ideal world that is underpinning the physical world and consisting of ideas, e.g. the real, eternal and immortal models.

Thirdly, there is an animistic characteristic implied in Plato's view of nature. The cosmos is thought of as a living being and "ensouled" with "reason and harmony", as stated in *Timaeus*: "when the father [Demiurge] who had begotten it perceived that the universe was alive and in motion, a shrine for the eternal gods,…" (Plato, 1965, p. 50) In sum, the physical world is taken as a living and motive whole which is bestowed but not identified with eternal intelligence: "The nature of the Living Being was eternal, and it was not possible to bestow this attribute fully on the created universe…" (Plato, 1965, p. 50) The animistic world can also be explained by the idea of the soul of the world.

Accordingly, the things of the visible world are modelled upon the forms of the invisible world. The artisan deity fits "the structure of the soul" and the corporeal world. "[T]he soul was woven right through from the center to the outermost heaven, which it enveloped from the outside and, revolving on itself, provided a divine source of unending and rational life for all time" (Timaeus, 37; Plato, 1965, p.49). The visible world is made and endowed with the invisible soul, and thus the soul of the world pervades its entire body. Viewed in light, the "soul" animates as well as permeates through the whole world and every living creature within. As Plato states in the conclusion of *Timaeus*:

> *For our world has now received its full complement of living creatures, mortal and immortal; it is a visible living creature, it contains all creatures that are visible and is itself an image of the intelligible; and it has thus become a visible god, supreme in greatness and excellence, beauty and perfection, a single, uniquely created heaven. (Plato, 1965, pp. 121-122)*

Overall, some educational implications might be drawn from the above discussions. First of all, according to Plato, the physical world is imperfect and incomplete on the

grounds of the dualist ontology and animistic natural physics. The physical world is a living whole as well as an imperfect and changeable whole. The maintenance of its order and orgnisation relies on Demiurge's modelling the ideal world. Demiurge bestows *telos* on these worldly beings and the *telos* turns into an immanent cause directing the movements of the beings. In this view, education could be understood as an activity with a pre-determined goal --- something perfect, good or true and unchangeable. This goal has already embedded in education *per se*; it regulates what and how educators should teach and pupils should learn. In this sense, education is a mission-like task or even a mission itself. Curriculum, in this view, is apparently a course which has been taken for progress. However, this view of education seems very coercive while no other possibility could be considered. This view could possibly lead to the traps of determinism and coercion.

Moreover, a problem concerning "imperfection" is implied in this view: since every thing is determined by its *telos*, so is imperfection. Then, how can education be undertaken for completion? How can an insufficiency which is essentially destined imperfect and incomplete turn into something perfect and complete? If all human and nonhuman beings in nature develop according to their immanent *telos*, as Timaeus suggests, then there should not be any evil in this world. In my understanding, this problem is an internal flaw of dualism.

According to Plato, evil as the disruption of the original order results from body --- the material part of being. However, this answer seems not completely plausible. On the one hand, Plato describes the physical material world as shadow of the real ideal world, thus the evil such as lack of proportion or disruption of order should be a shadow as well. Is the shadow of evil an image of a real idea of evil in the ideal world or an illusion? Both answers are confusing. This confusion illuminates the difficulty of this kind of dualism.

Plato's dualist metaphysics has difficulty in explaining the evil in the physical world: if this physical world is not "real", evil in the world is not real. If every thing in this material world is merely phenomenal, so is the evil. It is difficult to explain the source of evil in this two-world scheme. The dualist view might result in a discriminative and hierarchical perspective on education.

In Plato's cosmology, different degrees of importance are bestowed on the two

worlds: higher status bestowed to the world of eternal forms and lower status to the world of transitional matter. Plato's dualist philosophy is thus understood as the founder of objective idealism (Copleston, 1966a). The discrimination of two worlds (and two kinds of reality) is a factor in the formation of substance metaphysics through history. The conceiving of the everlasting and changeless being is shifted from the pre-Socratic notion of atom or element to Plato's idea, from matter to form. In this respect, we may find that philosophy of being rather than philosophy of becoming is more consonant with Plato's view. In Plato's mind, the real, such as the ideal or ideas or forms, are "beings" that will never change; while the unreal, the physical and the tangible are "becoming" that will never exist. As Plato states, "We must in my opinion begin by distinguishing between that which always is and never becomes from that which is always becoming but never is" (Plato, 1965, p. 40).

Plato's dualist and objective idealist view implies a correspondence between the phenomenal and the noumenal worlds which legitimises rating beings according to their "ideality" or "rationality". A hierarchical view can be found in Plato's perspective on social systems and educational institutions: in the *Republic*, Plato (1955) explicates an ideal educational system which educates, institutionalises and hierarchises every member of the society according to one's "nature". Moreover, rationality or ideality as a criterion for ranking the "value" or importance of beings easily leads to self-superiority of human beings, i.e., strong anthropocentrism or humanism.

However, in spite of the potential dangers for education implied in Plato's thoughts, he still gives us great inspirations for re-examining the meaning of education. The lack of perfection in the physical world reveals that all beings are innately embedded with a *telos* which drives human beings in pursuit of the immanent purpose. If the purpose is interpreted as an internal drive of process for "betterment" or "the more desirable" rather than as substantial essence of perfection and goodness, then Plato's philosophy of nature might is beneficial for education. As Copleston (1966a) points out, the aim of Plato in *Timaeus* in the following: "we should remember that we 'are only human', and so should accept 'the likely story and look for nothing further' --- words which might imply that it is just human frailty which renders true natural science impossible" (Copleston, 1966a; Plato, 1965). Therefore,

one important lesson that may be suggested from *Timaeus* is the impossibility of perfect physical science since it is impossible for the physical world to be revealed in its completeness and perfection. More importantly, since perfect physical science is impossible, a perfect learning of physical science is beyond human ability. In some sense, the recognition of human frailty, weakness and limitedness is significant for education; it may imply an ethics of conservativeness and modesty when envisaging the vast and great "Truth". Paradoxically, this ethical attitude seems to wane when Plato's another two important ideas of dualism and anthropocentrism enter the mainstream of the subsequent philosophical history, within which the primary status is given to human beings. This view is related to the second point and its implication for anthropocentrism and non-anthropocentrism will be explored in Chapter 6.

Plato's view of nature can be found to be more in tune with philosophy of being than philosophy of becoming. As previously argued, philosophy of being can result in static and hierarchical view of social and educational systems. Viewed in this light, Plato's view of nature can run the same risk of totalisation for education. None the less, it may shed light on the frailty of humanity and a perfect *telos* that is always worth pursuing. In this sense, Plato's view might encourage an education continuously striving for betterment, truths and ideals but neither "the Truth" nor "the Ideal". However, there may not be such end in this visible and tangible world although we are not certain if there is an invisible and intangible world.

4.1.2 Aristotle's view

The aim of this section is to discuss Aristotle's idea of telos of nature and its educational implications. Aristotle's view of nature is inspiring for broadening our conception of nature and education because his approaches to nature are varied, diverse, and ambivalent. His idea of nature can be divided into two parts: ontological nature and biological nature, or metaphysical nature and empirical nature. Most of his antecedents are concerned about the meaning of the former rather than the latter. On this respect, Aristotle's natural study is unique. There is both continuity and rupture between Aristotle's view and his antecedents'.

We may find that Aristotle's view of nature is very rich for us to reconsider and reconceive our present educational theories and practices as dialectical. His lifelong interest in the study of nature contains various and diverse subject matters and thereby makes him regarded as the originator of the scientific study of life (Bodnar, 2006; Lennox, 2006). The following exploration will demonstrate ambiguity implied in his view of nature: nature for Aristotle is animistic and mechanistic, becoming and being. Compared with the previous Greek natural philosophers, Aristotle's natural studies include natural philosophy and natural science. The subjects related to Aristotle's natural studies may involve not only the ideas interesting his antecedents, such as cosmology, physics, cosmogony, but also those commencing frontiers of study, like biology and zoology. Accordingly, the objects of Aristotle's natural studies may be classified into two kinds: ontological nature and biological nature.

Ontological nature consists in the abstract and formal ideas that his antecedents expound upon, while biological nature denotes the concrete and real objects that could be known through sense operations, such as observation. The scope of the former may be the traditional natural philosophy whereas the latter may be animal studies. We can find from the scope of Aristotle's natural study that the view of nature has been broadened and thereby more meanings of nature may be conferred. The succeeding discussion will further illustrate the dichotomisation of Aristotle's natural study.

First of all, Aristotle's idea of ontological nature, continuing the ancient Greek philosophers' metaphysical interest in pursuing the reality of nature, is basically concerned with the meaning of motion and change in and of nature. This idea is chiefly expounded in the *Physics* thus it can be a proper starting point of the discussion of Aristotle's ontological nature (Bodnar, 2006; Collingwood, 1960; Copleston, 1966a). In general, nature is taken as "the totality of objects which are material and subject to movement" (Copleston, 1966a, p.320). In the *Physics*, Aristotle considers the meanings of nature and identifies various meanings referred by the single word "nature" (Aristotle, 2004; Collingwood, 1960): (1) origin or birth; (2) that out of which things grow: seed; (3) the source of movement or change in natural objects; (4) the primitive matter out of which things are made; (5) the essence or form of natural things; (6) essence or form in general; (7) the essence of things which have a source of movement in themselves. However, the seven senses of nature can be

further understood, as the variations of the four causes: the material cause, efficient cause, formal cause and the final cause. Aristotle [*Physics, II*, 2] explains the four causes as follows:

> *In one sense, then, (1) that out of which a thing comes to be and which persists, is called 'cause', e.g. the bronze of the statue, the silver of the bowl, and the genera of which the bronze and the silver are species.*
> *In another sense (2) the form or the archetype, i.e. the statement of the essence, and its genera, are called 'causes' (e.g. of the octave the relation of 2:1, and generally number), and the parts in the definition.*
> *Again (3) the primary source of the change or coming to rest; e.g. the man who gave advice is a cause, the father is cause of the child, and generally what makes of what is made and what causes change of what is changed.*
> *Again (4) in the sense of end or 'that for the sake of which' a thing is done, e.g. health is the cause of walking about… The same is true also of all the intermediate steps which are brought about through the action of something else as means towards the end… All these things are 'for the sake of' the end, though they differ from one another in that some are activities, others instruments. (Aristotle, Physics II, 2)*

In Aristotle's view, the existence of all objects can be explained by the four causes. The four causes are proposed to explain why and how nature, all objects within nature and their motions come into being. Motion or change is, as Aristotle defined, a part of the nature of things. As he stated, "we physicists…must take for granted that the things that exist by nature are either all or some of them, in motion" (*Physics, I*, 2); furthermore, "motion is an attribute of a thing just when it is fully real in this way, and neither before nor after" (*Physics, III*, 1). Motion is the passage of matter into form, from potentiality into actuality. Aristotle's theory of four causes can be understood as an explanation of the being of becoming and the becoming of being. On this point, we may find that Aristotle's philosophy can ambivalently help as well as fail to conceive and develop a dynamical and flexible education. On the one hand, his thoughts could

do benefits for such kind of education is because his thoughts hold potential for developing an educational view from the philosophy of becoming, which highlights the significance of changes and unpredictability in lives and education and thereby is desirable for us. On the other, Aristotle's philosophy could be helpless for developing this kind of education because his thought assumes that formal cause as a necessary and definitive purpose is immanent in every particular being. Thus every being changes to actualise its form, yet this goal has already been decided. We may find that the danger of determinism could result from Aristotle's thoughts as well as Plato's.

However, Aristotle's ideas of form and matter, by comparison with Plato's, might still be more helpful for education. In Plato's philosophy, the real substance is the idea in the transcendent world of forms; while in Aristotle's philosophy, the substance is the very individual thing, incorporating form and matter together, existing in the physical world. Nature as the physical world for Plato might be an illusion; for Aristotle, it is real and therefore more highly valued. In comparison with Plato's idealism, Aristotle suggests that truth or reality can be found in each particular object. The value of every particular thing may bring educators and pupils to recognise the importance of every thing in nature as an object to be learned; in some respects, every thing can be taken as a subject matter for learning. This point might be in tune with the following discussion that Aristotle is an excellent empirical scientist and makes the best use of all senses. Furthermore, it may also remind us of the significance of experience in education and this point may be helpful in terms of addressing the emphasis on disembodied learning of our present curricula.

The second aspect of Aristotle's view of nature related to his animal studies is defined by this thesis as the view of biological nature. Aristotle's empirical study of biological nature can be taken as an intellectual pursuit different from the premodern philosophers. There are two implications of Aristotle's study of biological nature: animal study as an empirical science and the relationship between biological nature and ontological nature.

In relation to the first point, Aristotle's study of animals embodies the attitude and mentality of empirical studies, which will come to be fully developed in the modern sciences. There are more than 500 species of animals including shellfish, insects, birds, reptiles and quadrupeds that have been investigated and written about

carefully by Aristotle (Clutton-Brock, 1995). Aristotle's animal studies initiate a new perspective on, and attitude towards the scope and the composition of nature, which is different from his antecedents. Furthermore, the attitude towards animals in modern times is deeply influenced by Aristotle's doctrine of biological nature according to the hierarchical scale of nature with human beings[25] at the top, the active living beings below human beings and the inactive plants at the bottom. All the living beings are made for the sake of humans in Aristotle's view, and little has altered in this view through history (Clutton-Brock, 1995; Copleston, 1966a). This is closely related to the anthropocentric view of the human/nature relationship, which will be more fully discussed in Chapter 6. However, when we are invited to examine the human/nature relationship and the issues related to ethics, values, and their educational implications, Aristotle remains one of the important sources for reference.

In the second place, Aristotle may hint the importance of the roles played by both reason and experience in obtaining knowledge although soul or reason is understood as an intermediate between ontological nature and biological nature. I thus make a brief summary of Aristotle's theory of soul before discussing his idea of biological nature.[26] According to Aristotle, the soul is "the vital principle in living things…as form or act to the body" (Copleston, 1966a, p. 327). Soul is the form of body and body is the matter of soul. In this sense, the soul can be understood as "a system of functions which characterised a living being" (Rees, 1954, p. 107). There is a scale of nature corresponding to different levels of soul according to different stages of biological function. The lowest level of soul is the "nutritive or vegetative soul", exercising the faculties of nutrition such as assimilation and reproduction. The vegetative soul aims at the preservation of life and is possessed by all living beings including vegetation, animals and human beings. The next level of soul is the sensitive soul, exercising the faculties of movements. Vegetation does not possess the sensitive soul. The highest level of soul, only possessed by human beings, is the immortal reason or intellect (Copleston, 1966a). Overall, it can be found that the

[25] If expressed in more specific terms, the existents at the top of the hierarchy should be "man" rather than "human beings" because Aristotle takes "man" superior to "woman". However, the question concerning gender equity is not the focus of this thesis thus it is suspended.

[26] The entirety of Aristotle's theory of soul could be divided into two stages: in the first and earlier stage, Aristotle locates the soul in the heart, which is as something physical; in the second and later stage, the soul is understood as the form (Rees, 1954). The view of the soul in later stage is more mature and coherent with the entire Aristotle's philosophy thus it is chief idea adopted in this thesis.

notion of soul provides a psychological pillar for Aristotle's hierarchical view of biological nature; the other pillar is animal study.

In summary, some features can be drawn from Aristotle's view of nature that reveal an ambivalence:

Firstly, the feature of prioritising the idea of form over that of matter or the universal existent over the individual existent in Plato's philosophy has been reversed in Aristotle's philosophy. Every individual and particular thing, organic or inorganic, is in some respects the embodiment of four causes. Aristotle's view of nature can be understood as a materialist pluralism: nature consists of various particular beings which embody their innate forms or actualise their potentialities.

Secondly, Aristotle's view of nature includes the features of philosophy of being and becoming. On the one hand, Aristotle admits the existence of substance. On the other hand, he recognises the change or motion immanent in every being due to the process of actualisation of potentiality. None the less, Aristotle's notion of change may not be equivalent to Heraclitus' idea of flux. In my view, the emergent difference may be allowed in Heraclitus's idea of changing while change or motion in Aristotle's view is as a necessity, predetermined by the innate form of every object. His idea of becoming may be subservient to the idea of being. Therefore, Aristotle's nature is a mechanistic world.

The third point seems in conflict with the second one: nature in Aristotle's view can be understood as an animistic world. The world of nature for both Plato and Aristotle is a living world: a world characterized by motion with purposefulness. However, there is nuanced difference. As mentioned, Aristotle may put more stress on the change or process of movement of nature and the material factor of each individual existence in nature. Nature from Plato's perspective could be understood as the collection of images which are projected the transcendental mathematical ideas while for Aristotle, as the collection of various substances in motion according to the inherent four causes.

The fourth point worth noticing is that Aristotle's ontological hierarchy of nature implies a moral hierarchy. According to this view, nonhuman beings, the beings which lack reason or the so-called highest soul, are not eligible to have moral rights. They are by definition to exist for the sake of humankind. This view may have great

influence on contemporary environmental ethics.

The last point is related to the method of knowing and learning about nature. In Plato's view, reason may be the only reliable means of learning the truth of nature. By contrast, in Aristotle's philosophy, sense-perception can be taken as one of the sources of knowledge. However, the acceptance of sense-perception knowledge by Aristotle does not alter the priority of knowledge through reason.

4.1.3. The shift from immanent divine *telos* to transcendent divine *telos*

The exploration above has displayed the view of nature with immanent divine *telos*. According to many authors, the view of nature of the Middle Ages can be fundamentally regarded as premodern (Collingwood, 1945; Glacken, 1967; Morito, 2002). The ancient animistic and dualistic view was followed by many medieval church fathers and philosophers.

One significant change might be related to the concept of deity. The concept of the artisan-deity was replaced by the idea of Christian God. This change, as mentioned, designates the difference between Plato's artisan deity, who does not create the material he uses, and the Christian divine who uses the matter he creates. Generally, the premodern view of nature underpins the medieval view of nature. However, the meaning of nature/deity/humans relationship is somewhat different between the premodern view and Christianity: yet chiefly the Middle Ages view of nature is grounded on the premodern view.

For example, one of most important church fathers, St. Augustine, disagreed about the "literal comparison of God's creativity with man's artisanship" (Glacken, 1967). In his doctrine of two worlds --- the city of god and the city of man --- can be found the great influence of Plato's two-world scheme. St. Augustine adapts Plato's view in *Timaeus* in his writing and points out that the creator is superior to whatever he has created; moreover, he distinguishes the actual order in nature and human evaluation of it (Glacken, 1967, p. 198). There is a hierarchy in the actual order in nature: living beings are ranked higher than non-living beings; sentient beings higher than non-sentient beings; intelligent beings higher than merely sentient beings

(Glacken, 1967, pp. 198-199). Here it is to some extent consonant with Aristotle's view although St. Augustine fundamentally follows Plato's path.

After hundreds of years of neglect in the Western world while remaining an important figure in Arab philosophy, Aristotle regained his respect in the High Middle Ages (Copleston, 1966a, 19966b). St. Thomas Aquinas, one of the most prominent philosophers and theologians in the scholastic tradition, accepted and modified Aristotle's philosophy. In his *Summa Theologiae*, Aquinas offers five ways of proving the existence of God. The five proofs can be understood as the reformulation of Aristotle's theory of four causes and teleological view of nature. In general, Aquinas adopts the premodern artisan analogy to prove the existence of god: the more the richness, variety and multiplicity is observed in nature, the more the perfection of the creator is approached (Glacken, 1967, p. 230). Yet we have to bear in mind that god as the supreme is beyond any challenge in the Middle Ages; nature, in the view of Christian philosophers, is a "handmaiden" of god (Glacken, 1967, p. 218).

All in all, in spite of the differences between the premodern deity and medieval god and between the premodern physical world created *ex nihilo nihil* by the artisan-deity and medieval world created *ex nihilo* by god, the medieval view of nature can be regarded as the heir of the premodern view. The ancient and medieval ideas of teleology and divinity inherent in nature would be disrupted drastically in the modern times, which could be understood as the challenge of disenchantment of the Scientific Revolution. The related points will be fully argued in Chapter 5.

4.2 Nature with Transcendent Divine *Telos*: Anti-physico-theological View of Nature

The meaning of the concept of nature in ancient times underwent a change in Early Modern times: from a concept of nature with immanent divine purpose to that with transcendent divine purpose. This conceptual transformation results from the

refutation of physico-theology and the dedivinisation of the idea of nature. Both are related to the process of "disenchantment" which will be more fully discussed in Chapter 5. In relation to the refutations of the physico-theological view, Hume and Kant contribute important ideas.[27] Their philosophies of nature in relation to the notions of mechanism, dualism and teleology of nature are greatly influential (Aiken, 1948; Glacken, 1967). Therefore, Hume's and Kant's views are focused on in the following sections. It will be argued that Hume and Kant, as the representatives of modern Enlightenment thinkers, refine the mechanistic and dualistic view of nature. One of their means is the refutation of physico-theology. We may find that their views change the relationship between deity, nature and humans. On this view, the status of both deity and humans was elevated while that of nature was lowered.

4.2.1 Hume's rejection of physico-theological nature

Concerning theology, Hume is tremendously significant as one of the first philosophers giving rational arguments for religious beliefs, which can be called "rational" theology or "natural" theology. In Kant's view, Hume's attempt is not satisfactorily successful thus Hume's theological approach might be more appropriately called "skeptical theology". This point will be discussed in the next section. However, one important contribution for establishing rational theology that Hume made is the rejection of the physico-theological view and the related distinction between the fields of religion and nature. Since Hume, the borderline between natural science and theology has been clearly drawn. This results in the differentiation of science education from religion education and enhances the discipline of natural science as an academic subject because theology and science are taken as separate disciplinary realms. The religious influence or intervention in science which were usual in Middle Ages could be lessened. In order to prevent the very possible great controversy resulting from his book Hume accepted his friends' advice not to publish

[27] Not all the Enlightenment thinkers object to physico-teleology, such as Leibniz. However, as mentioned, many authors' views of nature may be complex and difficult to classify in one particular group. In this thesis, the ideas of "enchantment" and "disenchantment", that imply different attitudes towards nature, are taken as the criteria to determine the foci of the discussions.

the work concerning physico-theology: *Dialogues Concerning Natural Religion* (Fieser, 2006; Glacken, 1967).

This posthumous publication is regarded as "the most important contribution to the subject of philosophical theology" (Aiken, 1948 p. xii; Glacken, 1967, p.502) and actually can be understood as one of the most significant contributions to defy the teleological view of nature.[28] The fundamental argument of the teleological philosophy is to make an analogy between the supreme being, or god, or the final cause and humans because of the sophisticated likeness between nature or universe and the man-made artefact, e.g. a watch. The previous section has mentioned that the early modern scientists' disenchantment includes the replacement of animism by mechanism. The process of the replacement is gradually achieved on many levels. Yet Hume's work is crucial for his contribution to rational theology, as mentioned. The following exploration might help us to consider the difference between Hume's ideas of nature, humans and deity and his antecedents' and the educational implications.

Let us first examine how Hume discusses teleology. According to Hume (1948, p. 37), this argument can be abbreviated as "Like effects prove like causes". It is obvious that this view is very similar to the premodern artisan-analogy. As Hume states in Cleanthes' mouth,

> *Look around the world, contemplate the whole and every part of it: you will find it to be nothing but one great machine, subdivided into an infinite number of lesser machines…all these various machines, and even their most minute parts, are adjusted to each other with an accuracy which ravishes into admiration all men who have ever contemplated them. The curious adapting of means to ends, throughout all nature, resembles exactly, thought it much exceeds, the production*

[28] There are two fundamental views towards Hume's stance in *Dialogues Concerning Natural Religion*. One view thinks that Philo (as Hume) strangely changes his viewpoint in Part XII as an exponent of teleology. There are more commentators adopt this view, such as James Noxon (1964) and N. Kemp Smith (1947). The other view defended by, for example, B. M. Laing and M. A. D. Litt (1937) and W A. Parent (1976), rejects the turn of the stance of Philo (as Hume). In Parent's view, what Hume criticises is popular or vulgar religion but not truly pious theism. However, this debate does not influence the discussion in this thesis. As B. M. Laing and M. A. D. Litt (1937, p.178) point out: "…whatever Hume himself may have thought, his views, including the discussion in the *Dialogues*, lead, when carefully examined, to skeptical results". What concerns me is how Hume argues against physico-theology.

> *of human contrivance --- of human design, thought, wisdom, and intelligence. Since therefore the effects resemble each other, we are led to infer, by all the rules of analogy, that the causes also resemble, and that the Author of nature is somewhat similar to the mind of man, though possessed of much larger faculties…. By this argument a posteriori, and by this argument alone, do we prove at once the existence of a Deity and his similarity to human mind and intelligence. (Hume, 1948, p. 17)*

The paragraph above clearly demonstrates the argumentation of the teleological view of nature and religion. In summary, Hume's refutation of the teleological view may be divided into the following six points.

Firstly, Hume (1948) points out, in Philo's mouth, that the physico-theological argument is a "weak analogy… liable to error and uncertainty" (p.18) because it is inappropriate to make an immediate comparison between the man-made artefact and universe. Hume states carefully that, "Unless the cases be exactly similar, they repose no perfect confidence in applying their past observation to any particular phenomenon…. And unless the objects be quite familiar to us, it is the highest temerity to expect with assurance, after any of these changes, an event similar to that which before fell under our observation" (Hume, 1948, p. 21).

The statement reveals the thoughtlessness of the analogical reasoning and is related to the second point: Hume's empirical skepticism to the idea of causation. Hume argues that the idea of causation is flawed because it is based on a "projective error". All the ideas, according to Hume's epistemology, are derived from correspondent and resembling impression. However, there is no impression corresponding to the idea of causation. This lack of correspondence which is the projective error exists in the idea of causation (Langsam, 1994). The idea of causation is obviously dubious. Thus it is dubious to assume the existence of an artisan-deity as the final cause of nature.

Thirdly, there is a fallacy implied in this analogical argument, which is to draw the conclusion about the whole from parts. As Hume (1948, p. 22) criticises acutely, the employment of a rule abstracted from any one part to another very remote part is

an “illusion” and “partiality”. In other words, the whole is not identical to the totality of the parts.

The fourth and also a very interesting point is that, according to Hume (1948, pp. 21-22), animals seem to be more proper origins for discovering the principle of the whole nature than human contrivance. Yet animals are taken as living machines built in nature. If the artisan-deity cannot be certainly found in animals, it should not be found from human artefacts.

This notion is in relation to the fifth point which approves of the uncountable and inconclusive possibilities of nature and the derivative principles. In this light, the determination of the final cause as the “one and only *telos”* is to whittle down rather than enrich the meanings of nature. As Hume states:

> *Nature, we find, even from our limited experience, possesses infinite number of springs and principles which incessantly discover themselves on every change of her position and situation. And what new and unknown principles would actuate her in so new and unknown a situation as that of the formation of a universe, we cannot, without the utmost temerity, pretend to determine. (Hume, 1948, p. 22)*

The last point that Hume proposes in Part XI to refute the notion of natural deity is quite similar to the view of J. S. Mill (1999): there is natural evil that, to human reason, is neither necessary nor unavoidable. For example, there are natural circumstances in which people are liable to suffer from illness or pains. Some natural phenomena such as rain, heat and wind seem to be, on the one hand, necessary for survival of all, but on the other hand, pernicious when they become defective or excessive. In Hume’s mind, the so-called first cause is irrelevant to goodness or malice, thus “the original Source of all things is entirely indifferent to all these principles, and has no more regard to good above ill than heat above cold, or to drought above moisture, or to light above heavy” (Hume, 1948, p. 79).

The discussions above reveal that Hume problematises physico-theology by attacking its central argument: the analogical argument. It does not mean that Hume is an atheist but only shows his intention that understanding or knowledge about nature

cannot be appropriately used as evidence to prove the existence of god. As he states that "…intellect and understanding is not to be ascribed to the Deity, and that our most perfect worship consists, not in acts of veneration, reverence, gratitude or love; but in a mysterious self-annihilation or total extinction of all our faculties" (Hume, 1948, p. 156). The descriptions above show that human faith in religion is not built on the base of rational understanding. Then, what educational implications can we infer from this Humean nature from which the immanent deity has been separated? On this point, what Hume manifests to us might be the attitudes and means of understanding nature from a rational perspective with the so-called intellectual faculties. It is, on the one hand, a part of the process of establishing "Science" and a sort of "disenchantment", which will be focused more deeply in Chapter 5. On the other hand, nature is no longer a mysterious and occult kingdom but a big world-machine. This view seems to inspire optimism about the human ability to know and use nature. We may find that Hume partook in the sanguine ethos of the Enlightenment in the 18th century. The Humean critique of natural religion or the natural deity is consonant with the disenchantment of nature of the modern scientists. The fields of deity and nature are clearly distinguished. The next section will demonstrate that, like Hume, Kant makes significant contribution to the dedivinisation of nature.

4.2.2 Kant's argument against physico-theological nature

On the ground of Hume's view, Kant refined the refutation of physico-theology. Kant's critique of teleology can be divided into two parts: discussions about philosophy of inorganic nature and about organic nature. The second point inspires the conception of nature with non-divine *telos*, and, more importantly, has many implications for humanism or strong anthropocentrism. Viewed from an educational perspective, Kant fosters the autonomy and discipline of natural sciences and the implied idea of autonomous subjectivity, which, of course, have great impact on the later philosophy of science, environmental ethics and related educational ideas and practices. Moreover, Kant's ideas are important because they provide a connection

between the discussions of *telos* of nature and exploration related to the themes of dis/enchantment and non/anthropocentrism in the following chapters.

In the first place, the Kantian critique of teleology of nature can be further divided into two parts: the first part is related to Kant's refutation of physio-theology, the notion that takes natural deity as the ultimate end or cause of nature; the second part is related to natural ends.

The approach that Kant (1950) takes to criticise physico-theology is not in total agreement with Hume's although they both object to the analogy argument. Kant agrees with Hume on the criticism of the analogical argument of divine designer or natural deity; while he disagrees with Hume's view and attitude towards natural teleology. Kant agrees with Hume that it is not possible to know the supreme being through analogy between nature and the artefact but on different grounds. According to Kant, Hume mistakes the crux of physico-theology as "objective anthropomorphism" and attacks this wrong target. Kant claims the problem of the physico-theology that should be criticised is "symbolic anthropomorphism" (1950, pp. 104-107).

"Objective anthropomorphism" means making substantial claims about the nature of the deity (Kant, 1950, p. 107). It is questionable because it gives concrete description of properties of deity, such as benevolence and intelligence; actually, these properties are all beyond human experience. On this point Hume and Kant are consonant with each other. Hume argues "…since no question of fact can be proved otherwise than by experience, the existence of a Deity admits not only of proof from any other medium" (Hume, 1948, p. 47). A similar view can be found in Kant's works: "For our understanding is not a faculty of intuition, but of the connection of given intuitions in one experience. Experience must therefore contain all the objects for our concepts: but beyond it no concepts have any significance, as there is no intuition that might offer them a foundation" (Kant, 1950, p 64). It is obvious that they both admit that human knowledge can only be accessed in the field of experience, including knowledge about the natural deity. They both hold the view that the analogical argument makes an inappropriate comparison between nature and the man-made machine, between the divine artisan and the craftsman.

None the less, in Kant's mind, in order to circumvent this improper analogy, Hume substitutes skepticism for dogmatic anthropomorphism. The predicament of dogmatism or skepticism could be avoided if the "objective anthropomorphism" could be replaced by a "symbolic anthropomorphism", which "concerns language only and not the object itself" (Kant, 1950, pp. 105-106). For Kant, the deity is unknowable for the deity is part of the noumenal world, but it does not mean that theism has to be refused (Logan, 1998; McPherson, 1957). As Kant states, "Natural theology is such a concept at the boundary of human reason, being constrained to look beyond this boundary to the Idea of a Supreme Being (and, for practical purposes, to that of an intelligible world also),… it makes use of the reference of the world of sense to an independent reason as the cause of all its connections" (Kant, 1950, p. 109-110). Moreover, Kant in the later work *Critique of Judgment* (1914, 1952) points out that "physico-theology is the endeavour of reason to infer the supreme cause of nature and its properties from the purposes of nature (which can only be empirically known)… Now I say that Physico-theology, however far it may be pursued, can disclose to us nothing of a final purpose of creation; for it does not even extend to the question as to this…the purposive reference therein is and must be always considered only as conditioned in nature…" (Kant, 1914). The natural deity can only be "thought" through the symbolic analogy but cannot be "known" through substantial analogy. Overall, the above discussions show that Kant agrees with Hume on the disenchantment of nature while disagrees on the theistic commitment. Kantian critique of the analogy argument is more abstract than Hume's.

Kant's and Hume's critiques of physico-theology suggest a very important point for natural philosophy and education: the concepts of nature or supernatural deity and the implied *telos* are the results of human conceptualisation as well as the substance for learning. The standpoint which Hume takes is even more radical than that of Kant. Hume's incredulity towards the supernatural is not only epistemological but also metaphysical; while Kant makes a more rigorous but less radical differentiation between the fields of nature and of god, between religion and science, between theology and epistemology, to prevent the danger of skepticism, nihilism and atheism. However, their incredulity towards human knowledge of nature makes prominent the role of subjectivity: any knowledge must be learned by means of conceptualisation

which is an outcome of dealing with experience. In the view of Hume and Kant, human beings cannot directly know or experience things *per se*. Things can be only known through their appearances but not themselves. Viewed in this light, nature itself cannot be known directly but through our conceptualisation. The subject as a pivot for learning and knowing therefore turns inevitably important. It can be inferred from this point that the subject plays an irreplaceable and important role in constructing knowledge of nature. This point may be in tune with the humanism or anthropocentrism which will be explored in the next two chapters.

Now, let us examine Kant's view of teleology of and its relationship with organic nature. The following discussion will demonstrate the features of humanism or strong anthropocentrism and a hierarchical view of beings. From Kant's perspective, there are essential differences between living beings (or organisms) and non-living (or non-organism) beings, and human beings and non-human beings. Among all living-beings, human beings hold the primacy because they are the ultimate end for the other beings in nature. The nonhuman living beings exist for the ultimate sake of being humans, serving humans, directly or indirectly. These features are still influential in our current ethical thinking and the related educational ideas and practices.

The most significant points about organic nature and its purpose made by Kant are in *The Critique of Judgement* (1952, 2000). In the second part *The Critique of Teleological Judgement*, he proposes two maxims related to the understanding of organic nature, which are as follows:

> *The first maxim of such reflection is the thesis: All production of material things and their forms must be estimated as possible on mere mechanical laws. (Kant, 1952, § 70, p. 563)*
> *The second maxim is the antithesis: Some products of material nature cannot be estimated as possible on mere mechanical laws (that is, for estimating them quite a different law of causality is required, namely, that of final causes). (Kant, 1952, § 70, p. 563).*

A conflict between the two maxims can be obviously found in Kant's description thereby he calls the relationship between these two maxims as antinomy. For Kant both mechanical principles and causal laws can be used to provide proper explanation for inorganic or physical nature but not for the organic nature consisting of living and growing things. Mechanism may be used to provide an explanation to some extent for the organic nature because there is a material part in organism. However, the understanding of organic nature consists in mechanism as well as teleology.

However, this "opposition" is not incompatible. In Kant's (1952) view, organic nature, consisting of the so-called organised beings such as plants and animals, cannot be analogised as a machine and cannot be explained mechanically. In Kant's view, the purposiveness is embodied in organism's self-organising power, which distinguishes organisms from inorganic nature. This difference between organism and non-organisms will be given more comprehensive interpretation from the view of evolutionary biology. However, without knowledge about Darwinian biology, Kant still has very inspiring and interesting thoughts on this aspect: "An organised being is, therefore, not a mere machine. For a machine has solely *motive power*, whereas an organised being possesses inherent *formative power*…This, therefore, is a self-propagating formative power, which cannot be explained by the capacity of movement alone, that is to say, by mechanism" (Kant, 1952, § 65, p. 557). Two conditions can be found in Kant's work to differentiate organic nature from inorganic nature, or the beings of biology from the objects of physics:

> *(1) a thing exists as a physical end if it is (though in a double sense) both cause and effect of itself. (Kant, 1952, § 64, p. 555)*
> *(2) an organised natural product is one in which every part is reciprocally both end and means. (Kant, 1952, § 66, p. 558)*

The two conditions above make organic beings different from inorganic things. The difference marks out the natural end of organism or the organic natural end or physical end (Kant, § 65, p.557). A physical thing such as a work of art can only meet Condition (1). An organism meets both Conditions (1) and (2). For example, a plant or an animal can reproduce a new plant or animal of the same species. In this sense,

this plant or the animal is the cause and the effect of itself. Moreover, any part of the plant or the animal can neither live nor be understood when it is separated from the whole organism. As Kant states, "the preservation of one part is reciprocally dependent on the preservation of the other parts" (Kant, 1952, § 64, p. 556). All the parts and the whole of the organism are mutually dependent. Kant's distinction between living and non-living beings or organic and inorganic nature can be understood from two perspectives: the ontological and the epistemological.

Ontologically, the end or purposiveness of organisms is different from that of inorganic nature. Kant responds to Bluemenbach's theory of epigensis: "to suppose that crude matter, obeying mechanical laws, was originally its own architect, that life could have sprung up from the nature of what is void of life, and matter have spontaneously adopted the form of a self-maintaining finality, he justly declares to be contrary to reason" (Kant, 1952, § 81, p. 582). On this ground, Kant reveals the hypothesis *generation univoca*[29] in nature that argues for "the generation of something organic from something else that is also organic…" (Kant, 1952, § 80, p. 580n). This ontological difference is related to an epistemological difference.

Epistemologically, inorganic nature can be studied and made known by natural science, which is based on mechanical causal laws. However, mechanical causal laws can only provide incomplete explanation of the material part of the organic nature. The immaterial part requires a teleological explanation. Here lies the possibility of conciliation between the two maxims. This view may suggest that Kant approves of physico-theology which posits the deity as the natural (or supernatural) end but here his doctrine becomes self-refuting. Kant does not argue for physico-theology. Rather, Kant attempts to explain the self-organisation of the organic nature rationally without ascribing to supernatural power. However, the ultimate reason of self-organisation or self-generating remains an enigma: how and for what reason does the inert and crude matter turn into self-organising organisms? For Kant this might be the gap that cannot be explained through natural science. Biology as a natural science can only describe

[29] There are three other hypotheses: the first is the opposite notion of *generatio univoca* --- *generation aequivoca*, meaning "the generation of an organised being from crude inorganic matter"; the second and the third are related to *generatio univivoca*. They are the *generatio homonyma* and *generatio heteronyma*. The former one means that the organism can only be produced by its like kind. The latter one means that the organism can be produced by the organism in different forms of organisation. According to Kant, this situation is not within the range of our human experience. (Kant, 1952, § 80, p. 580n)

phenomena of organisms and find rational principles within the phenomenal world of organic nature but not the reason of the emergence of life. In order to solve this difficulty, Kant presents the idea of natural end which involves complex and intertwining meanings. However, his idea of organic natural end may be unpicked on two levels: the individual and the species.

The organism grows, develops, self-maintains, self-organises and self-preserves according to its intrinsic end (Ginsborg, 2004, 2005; Quarfood, 2006). In this sense, the organism is its own natural end. There is an obvious consonance between Kant's view and Aristotle's.

On the species level, a natural end exists in the relationships of different species of organisms. For example, the end of the fertility of soil is as the means to enable the plants to spread; the end of the vegetable kingdom is to provide sustenance for the herbivora; for the herbivora, their purpose to exist is for the sustenance of the carnivora. And human beings[30] are the "ultimate end of creation here upon earth" because they are "the one and only being upon it that is able to form a conception of ends and, from an aggregate of things purposively fashioned, to construct by the aid of [their] reason a system of ends" (Kant, 1952, § 82, p. 583). All in all, there is a dependent relationship within nature (including inorganic and organic nature) embracing the mineral, vegetable, animal and human worlds. Moreover, the terms of dependence can be reversed: the end of the existence of the herbivorous animals is to prove the growth of the vegetable kingdom; the purpose of the carnivora is to prevent the voracity of the herbivora; finally, the end of human existence is to ensure the establishment of the equilibrium of nature "by pursuing [the carnivora] and reducing their numbers" (Kant, 1952, §82, p.583). This view seems to suggest that human beings could be taken as a means rather than as an end.

However, the point that human beings can be taken as a means is not truly what Kant aims to mean. Actually, what Kant attempts to highlight is the "immutable" priority of human status in the process of cognition of nature. We may not forget that one of Kant's categorical imperatives as well as his great philosophical achievement

[30] In the original text, the subject Kant wrote is "man". The term "man" used in this description is liable to result in biases and debates. Many feminists and ecofeminists have made a lot of critiques of Kant view; however, whether Kant's view is gender-biased or not is not the focus of this thesis, thus the author replaces man with human beings.

is that humanity can only be treated as an end in itself and never as a means. Here in Kant's view teleological judgement, aiming to deal with natural ends, "contains a principle introduced by judgement completely *a priori* as the basis of its reflection upon nature" (Kant, 1952, § Introduction VIII, p. 473). Overall, the teleological exploration of nature is a part of human cognitive faculties, thus any judgement about natural ends inevitably assumes the laws *a priori* of human understanding and reason (Butts, 1990; Ginsborg, 2005; Kant, 1952, § Introduction IX, p.475). Here we may find in the doctrines of Kant the supremacy of human rationality which is one of the features of Enlightenment modern thought and influential on present education. This point is in tune with the previous discussion of the in organic nature.

It is interesting to find that Kant's view of organic nature on the species level implies the traces of contemporary notions of ecological thinking and, perhaps ironically, anthropocentric thought. Kant reveals the interrelationship between all species of organism within nature. None the less, human beings, as cognitive subjects, are prior to the other beings in the world. As Ginsborg (2005) points out: "our entitlement to ascribe objective purposiveness to natural beings, in particular to organisms, derives from our more fundamental entitlement to regard nature as (subjectively) purposive for our cognitive faculties". Overall, if Kant's view of nature can be understood as implying certain traces of ecological thinking, it can only be recognised on the ground of anthropocentrism, which in turn assumes epistemological dualism.

In sum, Kantian nature is rationalised and dedivinisied, or in another words, disenchanted, as will be explored in Chapter 5. Nature can be known from Kant's perspective by numerous ways: "…in respect of nature's merely empirical laws, we must think in nature a possibility of an endless multiplicity of empirical laws, which yet are contingent so far as our insight goes…" (Kant, 1952, § Introduction V, p. 468); what is more: "Understanding, by the possibility of its supplying *a priori* laws for nature, furnishes a proof of the fact that nature is recognised by us only as phenomenon, and in so doing points to its having a supersensible substrate; but this substrate it leaves quite *undetermined*" (Kant, 1952, § Introduction IX, p. 475). This reveals that nature, as a phenomenal world, is not known as a whole, all at once. It manifests itself as we examine it through sciences piece by piece. Kant's view

suggests numerous and meaningful possibilities to learn natural science. Yet the limitation is: only the empirical scientific methods consisting of observation, quantification, measurement, calculation and experimentation can achieve the learning of (natural) science.

What is noticeable is that Hume and Kant's refutation of teleological-theology separates the fields of natural studies and of deity, or natural sciences from religion. Due to the separation, the status of God is not diminished, rather, his authority as creator is still firmly believed to exist beyond this mechanical nature. The rejection of physico-theology reveals that there is no immanent purpose internal in nature but a supernatural final cause as end --- God. We may find that there are different meanings of the concept of *telos*. At least, two meanings can be found here: the immanent purpose or purposiveness of an entity and the transcendent purpose as a final end moving the entity towards an end. However, the complexity and plurality of the meaning of "*telos*" gradually acquired more and more notice after the advent of new sciences, especially biology.

4.3 Nature with Immanent Non-divine *Telos*

It can be shown from the above that the Humean and Kantian views epitomise the dedivinised and disenchanted concept of modern thinkers. They demystify and mechanise nature by refusing physico-theology and separating the field of deity from that of nature. On the one hand, the concept of purpose immanent in nature is denied; on the other, the belief in the creator as the final and transcendent cause of nature is maintained. However, the opposition to the idea of teleological nature of the period from the Scientific Revolution to the end of the 19th century was even called by the biologist K. E. von Baer "teleophobia" (Allen, 1952). Yet living nature is also taken as a proof of the existence and wisdom of God as the final end. Interestingly, the concepts of purpose implied in nature and a transcendent creator as final end have

more recently been seriously challenged by the development of new sciences such as evolutionary biology and physics.

Evolutionary biology, consisting of important concepts including natural selection, struggle for existence, competition, adaption and chance (Mayr, 2001), on the one hand, brings about significant challenge to the idea of God-Creator as the final end of nature; on the other, it inspires the reconsideration and re-conceptualisation of the non-divine purpose of nature.

In the first place, evolutionary biology is incompatible with creationism. Evolutionary biology can be briefly introduced as follows. First, nature as it appears is no creation by any supernatural deity but the result of evolution over time. Secondly, "evolution" denotes the change of the species over time by the processes of natural selection, mutation and variation. Thirdly, the processes of natural selection, mutation and variation do not occur by any predetermined end but by chance. In other words, nature is the result of random changes (Mayr, 1992, 2001). Inferred from the above are the denial of existence of the supernatural creator and the claim of common origin of all forms of life. To Darwin's contemporaries, this conclusion is quite unpalatable because it suggests that human beings' ancestors had been apes (Mayr, 2001). However, this point has already been accepted by modern people and may be greatly helpful for conceiving a "non-anthropocentric" approach to environmental philosophy since it manifests an intimate relation between human beings and nonhuman beings. This point will be discussed in Chapter 6. What interests us this point is that the belief in God-creator as a final end of nature has been discredited because of evolutionary theory.

In the second place, interestingly, a conception of secular teleology is affirmed because of the same reason --- evolutionary biology. Evolutionary biology, revealing a certain order and direction of the development of organic nature, has earned a lot of philosophers' attention to re-examine and reconsider its implications for teleology since the 20th century. The process of evolution of living nature, consisting of many highly diverse processes, seems to be an end-directed movement. The end-directed characteristic is explained by the conception of natural selection.

The conception of natural selection is acknowledged as one of the most important notions in Darwinian biology (Ayala, 1970; Mayr, 1992, 1999, 2001).

Basically, it is a mechanism of differential reproduction comprising multiple processes including "differential survival, differential mating success, and differential fecundity" (Ayala, 1970, p. 4). The zoologist and philosopher of biology E. Mayr classifies the multiple processes of natural selection as related to two themes: (1) the acquisition and maintenance of adaptedness of each kind of organism to its environment (niche); (2) the origin and further evolution of the multitude of species and higher taxa of organisms (1999, p. 372). The tendencies of perfection, variation, differentiation, specification, reproduction and diversification can be found in the organisms surviving the mechanism. Overall, the processes of biological evolution and natural selection appear to be an activity toward a certain goal or end. This understanding seems to suggest that evolutionary biology is a certain kind of determinism since there is a goal or end directing the growth and evolving of organisms. However, if evolutionary biology is examined carefully this misunderstanding can be avoided.

There are three interrelated factors implied in the process of natural selection: mutation, adaptation and environment. Research shows that adaptations of living organisms are varied responses to environmental challenges; organisms responding with appropriate adaptations survive or extinct. However, the "appropriate" adaptations occur in a "haphazard" fashion, "not compatible with a preordained plan" (Ayala, 1970). Evolution seems to lead to "improvement" or "progress"; natural selection appears to be an optimisation process. The process of natural selection leads to the optimisation of the whole species and individual organism, every part specialises to have the optimal function. The general definition of natural selection as "the adapted and fittest survives" is tenable on the level of the whole species or individual. None the less, Mayr (1992) points out that natural selection has no definite and long-range goal and is a *post hoc* decision: "Adaptedness thus is an posterior result rather than an a priori goal-seeking" (Mayr, 1992, p. 131). Natural selection is the achievement of the process of chance variations.

Natural selection manifests end-directed optimisation of the evolutionary process and brings critiques on the concept of *telos* of nature. Traditional teleology uses the term *telos* as incorporating the meanings of "goal", "end" and "purpose". Evolutionary biology is helpful to make explicit the difference between them: a goal

refers to a definite target which is anticipated when the process is undertaken; while an end simply denotes to the termination of a process (Mayr, 1992). "Purpose" is used to refer to the feature of purposive behaviour towards a particular end or goal. The definition of the term purposefulness given by Rosenblueth, Wiener and Bigelow (1943) can be taken as a referential point; it is used to denote "the act or behaviour may be interpreted as directed to the attainment of a goal --- i.e., to a final condition in which the behaving object reaches a definite correlation in time or in space with respect to another object or event" (1943, p. 18).[31]

Following this distinction, the concept of *telos* implied in organic nature may be understood as an end rather than a goal. The understanding that evolutionary process of organisms will attain a certain end-state or endpoint is actually acquired in human retrospect. The *telos* as end is a *post hoc* conclusion of evolution. Furthermore, the mechanism of natural selection appears to mark the features of *telos* of organic nature and the growth and development of organisms, regulating by DNA, shows a tendency of "programming" which can be analogised to the idea of divine design in the traditional teleology. The features of end-directedness and the tendency of optimisation suggest a biological teleology.

However, this biological teleology is different from traditional teleology. Some authors, such as Pierce (Mayr, 1992), suggest to draw out new terms to refer to this biological teleology. Accordingly, different terms are provided to describe the varied teleology.[32] Many authors accept the term "teleonomy", which was introduced in biology by C. S. Pittendrigh in 1958, to designate the developmental and end-directed

[31] The definition of purposefulness given by Rosenblueth, Wiener and Bigelow can be suitable for inanimate and animate objects. However, there are a lot of debates on this definition. See R. Taylor (1950) Comments on a mechanistic conception of purposefulness. *Philosophy of Science* 17(4), pp. 310-317. I. Scheffler (1959) Thoughts on teleology. *The British Journal for the Philosophy of Science* 9(36), pp. 265-284. In this thesis, the definition of purposefulness by Rosenblueth, Wiener and Bigelow, in my opinion, can be accepted partly but not completely. In my view, this definition is only suitable for animate beings, viz. organism.

[32] For example, Ayala (1970) points out that there are two classes of teleology in reference to the agency giving origin to the teleological mechanism: internal and external teleology. On the one hand, internal teleology means "the end-directedness of living organisms and their features"; furthermore, internal teleological systems can be used to explain natural selection. On the other, external teleology denotes the end-directedness of the man-made tools, and external teleological mechanisms are "products of human mind…the results of purposeful activity" (Ayala, 1970, p. 11). However, this interpretation, in my opinion, does not solve the confusion caused by the term *telos* in the field of biology. It seems to identify *telos* as the first cause or the first mover which can be found in organisms but does not exist in non-living beings.

process of organisms (De Laguna, 1962; Mayr, 1992, 1999, 2001). Pittendrigh (1958, p.394) states,

> *The biologist's long-standing confusion would be more fully removed if all end-directed systems were described by some other term, like "teleonomic", in order to emphasise that the recognition and description of end-directedness does not carry a commitment to Aristotelean teleology as an efficient causal principle.*

The above description sheds light on the difference between the concept of teleomonic *telos* and that of teleological *telos*. Yet Pittendrigh does not give a clear definition of teleonomy. On this ground, Mayr (1992, p. 127) refines the definition of teleonomy as follows:

> *All teleonomic behaviour is characterised by two components. It is guided by a "programme" and it depends on the existence of some end point, goal, or terminus which is foreseen in the programme which regulates the behaviour. This end point may be a structure (in development), a physio-logical function, the attainment of a geographical position (in migration), or a "consummatory act" in behaviour. Each particular programme is the result of natural selection, constantly adjusted by the selective value of the achieved end point.*

The neologism "teleonomy" might be a term which is not widely known. Overall, what is significant is that revolutionary biology reveals that teleology might be understood in a way that could bring multiple interpretations and fertile meanings. This evolutionary biological teleology (or teleonomy) manifests a living nature in development, evolution and process. This concept of *telos* in biology is not preordained goal determined by any transcendent deity but immanently embodied in every organism. Moreover, the *telos* is not a fixed but a changeable "programme". It

is not only a result of evolution but also a result in process because the process of evolution is undertaking throughout.

4.4 Summary

We have found many different and complex meanings of the concept of *telos* and the related views of nature. In reference to a physico-theological view of nature, it is understood as a divine purpose which implies the meanings of preordained goal and end point. This *telos* is immanent in and inseparable from nature. Within a mechanistic view of nature, the concept of *telos* is used to refer to a transcendent deity as well as a creator of nature whereby nature is separated from and regulated by the external divine *telos.* In reference to evolutionary biology, the concept of *telos* returns back to nature; it is taken as an immanent part of organisms.

In relation to different approaches to the concept of *telos,* three kinds of conception of nature can be found. Which one could be more educationally meaningful? Is it nature with or without divine *telos,* or with non-divine *telos*? What difference will it make when different views of nature are taught in relation to different concepts of *telos*? The educational implications might be understood from two perspectives: the relationships between deity, nature and humans, and metaphysics.

On the understanding of the relationships between deity, nature and humans, the three views are profoundly different from each other. The differences interestingly manifest changes of deity/nature/human relationships. The animistic view of nature with immanent divine *telos* assumes the equivalence of nature and deity (although as mentioned, Aristotle's view of nature is ambivalent). From the perspective of the proponents of nature with immanent divine *telos,* nature which is taken as embodiment of deity is the object for human beings to worship. We may find that an animistic view of nature is relatively not as influential as a mechanistic view in

current curricula. For most educators in modern times, it seems anti-intellectual to a certain extent to teach pupils that there is divine purpose within nature.

The authors who argue for the perspective of nature with transcendent divine *telos* such as Hume and Kant, on the one hand, attempt to ascertain the understanding of natural phenomena through modern scientific (or Newtonian) explanation and, on the other hand, keep their faith in God. Yet the faith in supernatural deity seems contradictory to scientific knowledge. The separation of the fields of religion and natural science could be one means to solve the contradiction between the supernatural and the natural. Following this, nature is taken as the object created by God for human use. The *telos* of nature is human beings. Nature is created for the sake of human beings and thus should be under human mastery. As historian Lynn White, Jr. (1967) points out that, according to Genesis, God creates human beings and the other living and non-living beings. However, what is significant is that human beings are made in God's image; moreover, human beings name all the animals and thereby establish their dominance over them (White, 1967, p. 1205). White's view is acknowledged to reveal the Judeo-Christian underpinning of anthropocentric thought. The anthropocentric view will be discussed more fully in Chapter 6. We can find the mutual relationships between the view of nature with transcendent *telos*, theism and anthropocentrism.

As for the view of nature with immanent non-divine *telos,* the deity is suspended. Human beings are taken as part of nature as they are results of evolution as well as the other organisms in nature. In this sense, this view may provide a ground for us to conceive a relatively egalitarian relationship between human beings and non-human beings. From the perspective of biological evolution, human beings are not necessarily supreme to the other living beings because theology no longer legimitises human mastery over nature. The "relatively egalitarian" view, which is related to the non-anthropocentric view, will be given more space in Chapter 6. Overall, the different conceptions of *telos* of nature offer us different orientations of the human/nature relationship. It can be helpful for human beings to re-examine and reconsider appropriately that human beings relate themselves to, locate themselves within and treat nature. This point implies a request for a deliberative re-evaluation

and ethical thinking in relation to nature and environment, which will be more fully argued in Chapter 6.

On the metaphysical level, the views of nature with divine *telos*, transcendent or immanent, can be found to be in more close relation to the philosophy of being than philosophy of becoming. The view of nature with divine *telos* assumes a world regulated by a fixed end (or goal) or ends (or goals). The view with immanent non-divine *telos*, in my view, is more related to the philosophy of becoming. This conception of immanent non-divine *telos* can be understood as a certain programme. In my understanding, the three views of nature could be at the same risk of falling into the trap of determinism although the former two may be more bounded than the last one. The reason is as follows.

In the views of nature with divine *telos*, whether be it immanent or transcendent, the idea of *telos* is a preordained plan for the subject to follow. The divine *telos* in some sense sets limits to all beings in nature and regulates their activities and development. For proponents, the divine deity itself might not be understood fully but the beings and the world created by the deity can be known if proper means of knowledge can be discovered, followed and educated for. However, there is optimism about mastering nature after the Scientific Revolution. This point, which is related to the theme of disenchantment and anthropocentrism, will be given more space in Chapters 5 and 6. Here what needs highlighting is that the view of nature with divine *telos* may assume determinism, which assumes that what happens has to happen because any being, thing, event or action is the result of antecedent conditions or causes, and from a given condition or cause the particular consequence must follow (Mardiros, 1936). However, the ultimate and final cause or condition is the divine *telos*.

For educators, there is a danger implied in the deterministic view because determinism is liable to lead to fatalism[33] that everything and everyone is predestined already and the aim of education, in this view, is to transmit the truth in accordance with the divine *telos*. Determinism can be defined as that all that happen have to happen and all that people do have to be done because they are for the sake of the

[33] Or, we may say that extreme determinism is fatalism. However, there is no borderline between "moderate" and "extreme" determinism. In addition, the attempt to separate them may go beyond the scope of this thesis. Here I use the term determinism in a more strict sense.

final *telos* (Mardiros, 1936). This view suggests the ideas of necessity and fate as the means and content of education. From this perspective, the cause and the end of human beings or non-human beings, nature or human nature, are all predetermined. Determinism in some sense seems to deprive human beings of their most precious possession, their self-determining personalities, viz., their individual freedom. Determinism is basically incompatible with ideas of free action, choice and responsibility, both on individual and social levels and therefore, a deterministic orientation of education might disregard learning about these ideas or even dismiss them from curriculum.

As for the perspective of *telos* which is non-divine and immanent in nature, the term "programme" denotes a plan which has existed prior to the initiation of the activity of development. Mayr (1992, pp. 127-128) defines a "programme" as "coded or prearranged information that controls a process (or behaviour) leading it towards a goal". In some sense, this perspective seems to suggest the restriction and regulation of the development of the individual on biological-physiological grounds. In some respects, it leads to the biological determinism which seems impossible for human beings to extricate from because the restrictions are physical and corporeal. Biological determinism under the crown of modern natural science is even more influential and persuasive than metaphysical determinism about the explanation of social life in the modern times. Many thinkers, such as Auguste Comte, Herbert Spencer, Emile Durkheim, develop social evolutionism incorporating the ideas of natural selection and evolutionary mechanism. For them, the task of education is to shape citizens to comply with the inevitably pre-determined history, to maintain social order, roles, and cohesion. However, this view shows strong deterministic sense and seems easily to fall into the same trap of metaphysical or religious determinism. Moreover, this view of nature with non-divine *telos* seems to be in opposition rather than accord with philosophy of becoming.

It can be granted that the biological view might embrace determinism because there are natural, biological and physiological limitations of individual growth and development. Taking a microscopic view, individual growth and development is controlled to a large extent by the natural programme, for instance, DNA. Yet the way DNA that regulates human growth development is not as precise and rigorous as the

software that controls the operation of hardware. There are always mutations and exceptions in the physical, mental and environmental realms. This biological limitation should not be reified as transcendental essence. Moreover, the process of natural selection is unpredictable; it is a process full of opportunities, chance, accidents and changes. Taking a macroscopic view, the *telos* as "programme" immanent in organisms is a result of evolution and still under evolution. It is not an absolute, divine, and unchallengeable essence. As mentioned, there are chances of mutation and adaptation during the process of evolution. Thus, the non-divine *telos* as programme is still itself the process of changing, and becoming.

I conclude that an evolutionary view of nature with non-divine *telos* could be more educationally meaningful and helpful than a view of nature with divine *telos* in three respects: 1) It might remind educators and pupils of the unpredictability, vastness and wonders in nature. This might help to overcome our human hubris in relation to nature and develop a healthier, less arrogant attitude towards nature. 2) It holds potential for educators and pupils to learn about freedom. In addition, although both views share the similar possibility of falling into the trap of a deterministic approach to education, the view of an open-ended, biological *telos* contains more possibilities of change and alteration so that it may open the space of freedom for individuals. 3) It implies the idea of embodiment to overcome the predicament of disembodiment in our present curriculum. Moreover, human beings, as one achievement of natural evolution, embody the "programme" or "*telos*" physically. In this sense, rationality is also one outcome of natural evolution rather than a gift from any transcendental deity; human beings are thus corporeal beings integrating with mind and body rather than beings with "souls". This point invites us to ponder upon the meanings of embodied experience: our educational tradition and curriculum tend to emphasise the intellectual faculties and related subjects, such as mathematics; by contrast, physical education and embodied, emotional experiences are relatively undervalued. The biological view of nature may give us potential to improve this narrowness of focus in education and the implications related to the meanings of rational humanism and embodiment will be explored more fully in the following chapters.

Finally, after explaining the differences which could be brought to enrich education by various concepts of nature with a different *telos,* we can turn back to the questions anchoring our exploration and to evaluate the benefits and hindrance that different concepts of nature with different concepts of *telos* might bring to education. What kind of concept of *telos* which nature implies could be most educationally meaningful? Among these concepts of nature, I suggest, the one which can carry the most copious possibilities and inspirations is the view of nature with non-divine and immanent *telos*, which is biologically and dynamically constructed and embodied. The concept of nature with a non-divine immanent *telos* implies freedom and activity rather than determination and passivity of every individual. It is thus educationally meaningful and worth learning.

5

Disenchanted or Enchanted?

If we prefer the concept of nature as becoming to that of being, nature with non-divine *telos* rather than one with divine *telos*, should we regard nature as enchanted or disenchanted? Which view is more helpful for conceiving educational ideas and practices? Which view would prove most helpful for extricating our current curricula from over-simplifications? The aim of this chapter is to investigate disenchanted and enchanted views of nature and their educational implications. It will demonstrate that a disenchanted view is overemphasised and an enchanted view is undervalued in mainstream educational discourses; thus one of the ways to improve the unbalanced situation in education is to pay more attention to the enchanted view.

The concepts of "enchantment" and "disenchantment" are best understood through their interrelationship. These two concepts have had varying interpretations. A typical and widely accepted definition is given by Max Weber. According to Weber (1948, p.155), "disenchantment" is defined as "rationalisation and intellectualisation".

Following this line, the concept of "enchantment" is often related to "premodern thoughts" and "disenchantment" with "modernity". As mentioned in Chapter 4, the process of turning ancient animistic views of nature into modern mechanistic views consists in the rejection of ancient ideologies of physico-theology and animism. Refutation of physico-theology has already been discussed in Chapter 4; while the rejection of animism which will be explicated in this chapter is the process of disenchantment.

Some discourses related to the issue of environment or nature tend to make a contrast between the premodern animistic view of nature and the modern

disenchanted worldview (Beck, 1995). Yet this contrast conceals as much as it reveals because it seems to suggest that the premodern view of nature is exclusively animistic and the modern view of nature absolutely dedivinised. I disagree with a polarisation of views merely according to a timeline. We will find that the enchanted and animistic view is not exclusive in premodern times; a similar hue can be found in Romantics' works of nature in the 19th century, for example, in Wordsworth's poetry.

First of all, the meaning of "disenchantment" is revealed by exploring the scientific and mechanistic view of nature. The mechanistic and scientific view of nature can be taken as a great achievement of the Scientific Revolution. It reveals the characteristic of the modern view as an attempt to find the truest, the most standardised and unitary view of nature. For the disenchanted thinkers including the early modern scientists and Enlightenment thinkers, scientific methods are the tools to help to find the only one truth of nature, as the means to provide validity of the standardised view and establish an autonomous discipline of "Science" providing the criteria of scientific knowledge. It will be argued that the aim of the disenchantment is to establish "Science" by a series of activities including mathematisation, dedivinisation, rationalisation, and intellectualisation of nature. The exploration will uncover the proximity of the idea of disenchantment with philosophy of being on the metaphysical level and with some pitfalls of our present curricula.

Next, the meaning of "enchantment" is going to be explored by discussing the Romantic view. It will reveal that Romantics, in particular, Rousseau and Wordsworth, call for an intimate and agreeable relationship between human beings and nature by appealing to mutual and reciprocal relationships between nature as a whole and human nature.

This thesis offers a definition of the concept of enchantment of nature as the emotional experience of appreciating the wonders and marvels of a still largely unintelligible nature, whereas the concept of disenchantment of nature is defined as the emotionless experience of intelligible, demystified and dedivinised nature. The definitions are rough because there are two inextricable factors involved: a subjective factor related to human responses and attitudes towards nature and an objective factor related to nature itself. Both factors are interrelated and inseparable. When a concept of disenchanted nature is under consideration, the concept must imply two things: an

idea of disenchanted nature as an object of thought and subjective attitudes such as indifference or impartial, non-personal dispassionateness. This disenchanted nature, can or will be completely, in Weber's terms, rationalised and intellectualised (Weber, 1948). Likewise, when we ponder on a concept of enchanted nature, we refers to nature which has not been fully rationalised and intellectualised and is treated with feelings, regard, or esteem. Yet the subjective and objective factors may be mutually and paradoxically fortified; neither one is cause or effect. In my view, underpinning the conceptions of disenchantment or enchantment lies a will, a wish or a hope. It is because we wish to treat nature indifferently, we aim to disenchant it, and *vice versa*. In like manner, it is due to our hope to care for nature, we would like to enchant it, and *vice versa*. Overall, there is no disenchanted nature or enchanted nature *per se*, but rather the conception of nature apprehended through our "disenchanted" or "enchanted" perspective. "Disenchantment" and "enchantment" are not only perspectives that we take, but also active, creative processes whereby we conceptualise nature.

Moreover, these two attitudes may not be an either/or option for learners. For example, scientists may have feelings of wonder and surprise about nature. As Ilya Prigogine (Prigogine & Stengers, 1985) says, the inaccessibility of knowledge of nature can be understood in poetic terms, such as Tagore's poetry. The problem is that such feelings towards nature are not taken as main foci in mainstream education about natural science. The above discussion of curriculum shows that current science education, implicitly or explicitly, overemphasises the importance of rational indifferent attitudes and underestimates affectivity in the process of learning about natural science.

Then, the question "Is the enchanted or disenchanted perspective more helpful for conceiving educational ideas and practices?" implies the following two questions: Is the attitude of caring or indifference towards nature more helpful for conceiving educational ideas and practices? Which is most value-profitable in educating? The picture of enchanted or disenchanted nature? Neither of the questions has priority over the other; yet exploration of both will orient us towards a more meaningful learning. Under this theme, it will be argued that an enchanted perspective might invoke richer meanings for education than a disenchanted one.

5.1 Disenchanted Nature and a Rational Attitude

This section aims at exploring the disenchanted view of "nature" and its implications for education by focusing on modern scientists' views. As mentioned, the disenchanted view assumes a rational and indifferent attitude towards nature and aspires to take nature as an intelligible and controllable machine and fosters this mechanistic view of nature by taking an objective and scientific stance. These assumptions of scientific attitude and mechanistic nature are inextricably interwoven in the process of disenchantment and they influence our education at present.

The process of disenchantment is a journey of establishing "Science" as an autonomous, objective and modern discipline including scientific knowledge, criteria of knowledge and research methods. The final goal of Science is to make nature intelligible. Many authors (Butterfield, 1949; Coates, 1998; Daston, 1998; Glacken, 1967; Husserl, 1970; Merchant, 1983) agree that the Scientific Revolution might be a turning point in history for its great contribution of establishment of "Modern Natural Science". Some authors date the year 1543 --- the year when Copernicus' *On the Revolutions of the Heavenly Sphere* (*De revolutionibus orbium coelestium*) was published --- as a milestone of the modern view of nature (Collingwood, 1945). The process of disenchantment, according to Weber (1948, p. 155), could be understood as a process of "rationalisation" and "intellectualisation". Thus in some sense, the Scientific Revolution initiates the disenchantment in history. However, the meaning of nature is gradually transformed rather than there being a sudden change during the long and complex process of disenchantment. We unpick the complicated process by the following threads: 1) mechanistic view of nature, 2) a separation of religion from natural sciences, 3) the transformation of the deity/human/nature relationship, 4) mathematical methods and methodologies for probing nature and, 5) humanism or strong anthropocentrism. However, these five threads, characterising the movement of disenchantment, are intertwined, inter-referential and inter-dependent.

First, the significant feature of disenchantment can be articulated as the mechanistic view of nature by demystification or secularisation. Although a primeval form of mechanistic view can be found in the ancient Greek philosophy of being; yet the animistic view occupied many premodern thinkers' minds. In premodern times, nature was taken by many thinkers as a living world full of soul. This is the so-called animistic view. Having undergone the process of disenchantment, nature which has been demystified is no longer taken as a living whole but a machine-like object. Nature, in some sense, "lost its soul" (Daston, 1998, p.150).

Daston points out that nature, after early modern times, is "no longer animated nor active" and "reduced to brute, passive, stupid matter" (Daston, 1998, pp.150-151). Thus premodern nature with creativity and deity was transformed by the Scientific Revolution into a neutral machine, blindly obedient to cause and effect (Daston, 1998). For some authors like Daston, deity implies creativity; hence nature with deity is a creative nature. However, I may not agree with Daston on this point. The discussion about *telos* of nature in Chapter 4 has demonstrated that a secular view of nature could be creative because dedivinisation or secularisation is not identified as mechanisation. Yet for modern thinkers, dedivinisation tends to assume mechanisation; thus a non-divine nature is "just a machine".

The disenchantment of nature, however, does not endanger the religious belief in God. This is the second feature of disenchantment: a separation between the field of deity and that of nature or between theology and natural sciences. This point can be found in the leading figures of the Scientific Revolution. For example, Nicholaus Copernicus (1473-1543), Johannes Kepler (1571-1630) and Galileo Galilei (1564-1642) who found the base for modern sciences are still devoted believers in the divine harmony and the order of creation in the cosmos (Butterfield, 1949; Coates, 1998). In Scribner's terms, disenchantment is a separation between the fields of "magic" and "religion" (Scribner, 1993). This point is in tune with the discussion in Chapter 4. Chapter 4 has pointed out that modern thinkers separate the divine *telos* from nature by the refutation of physico-theology and, in this process, they rerank god, humans and nature.

The reranking between god, nature and humans is the third feature of disenchantment in modern times. As mentioned, in premodern times, the relationship

between God, nature and humans is to take both God and nature as superior to humans. In modern times, this order has been rearranged as follows: the supreme is the God, below are the humans and nature is at the bottom. It is apparent that the human/nature relationship has changed.[34] As Glacken (1967, p.376) points out, "most of the great names in early modern science did not deny design in nature nor the validity of final causes…" What is more,

> *[t]he adherents of the design argument saw in the new science the means by which man could fulfill his destiny, under God's plan and guidance, to improve the earth as his dwelling place; they saw that the new principles of scientific investigation meant knowledge of natural law, that the knowledge of law meant control over nature in the widest possible sense. (Glacken, 1967, p.380)*

In summary, the development of early modern science separates god or deity from nature. With the levelling down of the status of nature the prestige of humans is elevated. Early modern science "spelt the doom of Ptolemy and Aristotle" (Butterfield, 1949, p.59), and replaced the animistic world with mechanistic nature. This process of disenchantment and dedivinisation, inheriting and changing the ancient picture of nature, depicts a mechanistic and atomist view of nature composed of a set of miscellaneous and objective items.

Fourth, the movement of disenchantment consists to a large extent in the new scientific methods including idealisation, observation, measurement, calculation, mathematics, experimentation and reasoning. It is very obvious that these methods still play very important parts in our current curricula of natural sciences. Previous discussions have revealed that they are the main ways that pupils learn "how to learn" about nature in school. Husserl points out that the concept of idealisation can be

[34] A similar discussion can be found in O'Riordan's work (1989). He presents two modes to explain the relationship between god, nature and human beings. However, according to the nurturing mode, "God created the Earth, and then human beings. This is the original Hebrew version of the Genesis myth as adopted by the more conservative Greek and Roman traditions…" (O'Riordan, 1989, p. 83). I may not agree on the point that God is prior to Earth in Greek tradition. It can be found from the previous discussion on Demiurge that this artisan-deity is not prior to the world. O'Riordan, T. (1989) The challenge for environmentalism. In R. Peet & N. Thrift (Eds.) *New Models in Geography* (London: Unwin Hyman), pp. 77–102.

understood as the distinguishing characteristic of modern science. Modern science is rooted in the Greek idealist tradition which "leads to the development of pure mathematics as pure science of ideas, science of possible objects in general as objects determined by ideas" (Husserl, 1970, p. 310). The "mathematisation" of scientific methods denotes the idealisation and universalisation of all objects in nature that are to be known through mathematics, especially Galileo's geometry. As Collingwood (1945) points out, modern science reaches its maturity with Galileo. Because of Galileo's geometry, "nature…becomes… a mathematical manifold" (Husserl, 1970, p.23).

The mathematisation is all-embracing: all things in the universe can be quantified, measured, and calculated. In Galileo's own terms, "The great book of nature can be read only by those who know the language in which it is written, and this language is mathematics" (Devlin, 1996, p. 344). Mathematics is taken as the universal and powerful tool which can penetrate and grasp all of nature and all objects within. Thus the modern scientists' view of nature could be understood as "mathematised nature" and their methods could be understood as grounded on this idealised mathematics.

Kant promotes the tendency of mathematisation of modern natural sciences. Kant defines rationalisation as a criterion of natural science in its definition and scope. According to Kant (1786/1985), the doctrine of nature includes the historical doctrine of nature and natural science. The former contains "the systematically ordered facts regarding natural things (which again would consist of the description of nature… and the history of nature)" (Kant, 1786/1985, p. 468). The latter could in turn be divided into natural science proper and natural science improper: the natural science proper is the science which "treats its object wholly according to a priori principles" and the science improper that "according to the laws of experience" (Kant, 1786/1985, p. 468). The definition of the science proper can be found in the description given by Kant:

> *Only that whose certainty is apodeictic can be called science proper… That whole of cognition which is systematic can therefore be called science, and, when the connection of cognition in this system is a coherence of grounds and consequents, rational science… But when*

> *these grounds or principles are ultimately merely empirical,… and when the laws from which reason explains the given facts are merely laws of experience, then they carry with themselves no consciousness of necessity (are not apodeictically certain), and thus the whole does not in a strict sense deserve the name of science… A rational doctrine of nature, then, deserves the name of natural science only when the natural laws that underlie it are cognised a priori and are not merely laws of experience. (Kant, 1786/1985, p. 468)*

According to the above, some features of the so-called proper, pure and rational natural science can be discovered: the doctrine of science must be characterised by the following features including 1) coherence, 2) necessity or apodeictic certainty, 3) cognition *a priori* and 4) rational principles. The hierarchical dualism in epistemology of early modern scientists is sophisticatedly adapted in Kantian philosophy of nature. According to Kant, the science which is grounded on experience carries no necessity. This empirical science is thus rather called "systematic art" than science. For example, chemistry can never be taken as science proper because its principles "are merely empirical and admit of no presentation a priori in intuition" (Kant, 1786/1985, p. 471).

On this view, mathematisation is an irreplaceable criterion to discriminate science proper from science improper; Kant states that, "the principles of chemical phenomena cannot make the possibility of such phenomena in the least conceivable inasmuch as they are incapable of the application of mathematics" (Kant, 1786/1985, p. 471). This point is in tune with what Kant states at the end of the Preface of *Metaphysical foundations of natural science* that the metaphysical study of natural science is to bring unison with "the mathematical doctrine of motion" (Kant, 1786/1985: 478). However, this feature might be one of the widespread beliefs in education. The discussion in Chapter 2 has shown the unreflective, uncritical confidence in mathematics as a scientific tool in the present Taiwanese curriculum.

The appearance of new methods and methodologies implies an emotionless attitude towards nature. Ancient cosmologists conceive nature by means of observation and speculation with complicated and complex feelings including admiration or fear; while modern scientists study nature by means of observation,

measurement, calculation, mathematics, experimentation and reasoning --- without emotions (or without conscious awareness of emotions). This attitude is highly rated in science education. The goals of science education, as revealed in Chapter 2, include comprehension of scientific knowledge and attitudes. The scientific attitude intertwined with scientific methods is a mentality stressing indifference, disinterest, objectivity and neutrality. It is in tune with what we have analysed in our science education curricula: pupils are expected to have objective, neutral, indifferent and disinterested attitudes towards subject matters. They are expected to "de-personal-ise" themselves.

New methods and technologies can strengthen learning of Science (consisting of scientific knowledge and attitudes). Galileo's telescope is a typical instance. As a scientific tool, the telescope avails human beings to observe nature from a certain distance; more importantly, it allows human beings to be "indifferent observers" of nature and thereby turns nature into "indifferent stuff". Nature is thus taken as an "object" external to our subjective experiential field. There is and should be a certain distinction (and distance) between human beings and external nature according to the modernist scientific view. The distance between human beings and nature is demarcated as psychological and physical nature/human boundaries. For example, mathematics produces psychological distance whereas Galileo's telescope, one of the so-called milestones of the Scientific Revolution,[35] creates a physical distance between humans and nature. Human beings are in some respects alienated from nature and *vice versa*. However, what is indispensible are the rigorous and objective scientific methods including mathematics, experimentation, observation, measurement, calculation, and reasoning. From the perspective of modern scientists, human world and natural world are separate and the communication consists in "Science". Science, in one respect, assures the "quality" of natural knowledge because it is acquired through rigorous methods and procedures; in some other respects, it sets limits to human experience of nature and thereby reduces its emotional charge. This reduction is one of the origins of the oversimplification of our present education. Yet this drawback is usually ignored because the efficiency and performativity of Science is conspicuous and powerful. As Bacon states, "Human knowledge and human power

[35] Copernican heliocentricism, Kepler's clockwork analogy and Galileo's telescope are regarded as three milestones of the Scientific Revolution (Butterfield, 1949; Coates, 1998).

meet in one" (well-known as "knowledge itself is power") (cited in Coates, 1998, p. 72). Bacon's words can be articulated in more detail as follows, "Human knowledge of nature and human power over it meet in one". Following Bacon, the pursuit of deployment and exploitation of nature seems to be taken as the chief aim of learning natural sciences; the (pragmatic) criteria of evaluation rely on assessment of efficiency in attaining the aim. "If it works, it is true". On this ground, a motto of learning modern science can be drawn out: the more efficiently a set of knowledge makes use of nature, the more it is valued scientifically, and the more value it has to be learned. None the less, I disagree with this simplified view of education about nature because it reduces the significance of our living and learning. The danger of meaning-deprivation is also implied in the next feature of disenchantment.

The fifth feature of disenchantment can be understood as humanism or strong anthropocentrism although humanism predates modern science. The ancient Greek post-Socratic philosophy is distinguished from the pre-Socratic philosophy by the philosophical interest in human beings themselves (Copleston, 1966a). This interest gains strength from modern science and begets strong self-confidence in human beings and reason which is a key feature of modern humanism or strong anthropocentrism. Modern humanism is inevitably connected with the trust in and reliance on modern scientific methods and the implied scientific attitude. Reciprocally, the efficiency and powerfulness of Science brings human beings much confidence about their own ability to use reason, or rationality. The ability to learn and establish Science is believed in as an exclusive talent bestowed by God and this belief is strengthened by the catharsis and huge success of Newton and the Copernican Revolution. This ability distinguishing human beings from other animals is rationality. A good example of rationality could be the ability to use abstract ideas in order to make rigorous and logical inference, calculation, generalisation, i.e., idealisation. According to Edmund Husserl (1970), early modern thinkers' geometrical and mathematical reasoning could be taken as the epitome of rationality. In their mind, there is no sphere which mathematics cannot penetrate, investigate and apprehend --- as long as it is "science".

Husserl points out that the most significant point of early modern science is to transform the idea "fundamentally", to establish the universal philosophy which

marks off the “the beginning of the modern age”. This crucial change is the substitution of the ancient idea for “mathematics (as geometry and as formal-abstract theory of numbers and magnitudes)…” (Husserl, 1970, p. 21). For the ancients, the geometrical methodology is a “practical art of measuring” in a prescientific world. Owing to Galileo, this practical methodology has been realised to “‘calculate’ with compelling necessity” and to make “possible hypotheses, inductions, predictions about the unknowns of its present, its past, and its future” (Husserl, 1970, p.33). We may perceive a danger implied in the ambition of apprehending the whole of nature by means of universal mathematics. It is, indeed, a reduction and the impoverishment of the meanings of human experience and thereby results in the pitfalls of our present education.

This problem can be alleviated by means of the source of meanings: our everyday life experience, or lifeworld. Our experience of nature is originally rich in potential; it is the source for us to comprehend and invent various possibilities of expression, interpretation, conceptualisation and meaning. These meanings could be revealed by different kinds of expression such as poetry, painting, music, and so on. However, in order to meet the criteria of Science, human experience has to be purified; what and how human beings experience nature has to be “idealised” and “standardised”. For modern scientists, the best instrument to idealise and standardise experience is mathematics. In order to meet the requirements of mathematics, the objects to be surveyed have been “cleansed” of their impurities by the systematisation of mathematisation (Husserl, 1970). Geometry is a typical example. As an important branch of mathematics, according to Husserl, geometry in ancient times is firstly an “art of measurement” applied to the physical objects such as rivers, mountains and buildings. Then it reveals objective knowledge, the relations between the shapes of the objects, through measurement. The “practically objectivising function” of geometry becomes “idealised and thus turned into the purely geometrical way of thinking” (Husserl, 1970, p. 28). Until early modern times, geometry is broadly applied to astronomy as well as on earth. Geometry is a mathematical praxis which determines the ideal and pure shapes of practical objects. However, this “determination” reduces some parts of experiences of the objects, the “vague”, “fuzzy”, or “ambiguous” parts of nature, which are parts of everyday life experience,

or lifeworld.

As mentioned earlier, everyday life experience is rich in potentials and meanings. "So-called" objective scientific knowledge can be seen as one part of everyday life experience and is the result of the process of abstraction or distillation. Thus the mathematisation of nature is one of many views of the experiences of nature rather than one totalising view. As Husserl states,

> *The perceived, the experienced as such, is thoroughly "vague"; it always stands, taken in harmonious experience, under the essential law of a certain gradation of perfection which always exists as an ideal possibility. Accordingly, I can have the same characteristic given more or less "clearly"; and, no matter how clear it is, yet another gradation is still thinkable. (Husserl, 1970, p. 307)*

Thus the modern scientists' disenchanted view provides one of many views of nature and knowledge. When this disenchanted view is taken as an infallible ground for learning about nature, its companion is the danger of meaning-deprivation. For example, in the view of Galileo, the truth of nature "consists in mathematical facts; what is real and intelligible in nature is that which is measurable and quantitative (a positivist view). Qualitative distinctions…have no place in the structure of the natural world…" (Collingwood, 1945, p. 102). The danger of meaning-deprivation can be found in Galileo's perspective.

The features of "mathematisation" and "idealisation" of disenchanted nature manifest a tendency of disembodiment which emphasise abstract, incorporeal, perennial concepts. Its educational influence can be conspicuously found in our present curricula. The discussion in Chapter 2 has shown that learning about nature is mainly concerned with abstract concepts and quantified and measurable knowledge of nature. Furthermore, subjects are evaluated according to how rational they are judged to be; for example, mathematics is evaluated as highly important and physical education as much less. In Taiwan, subjects related to science, literacy, numeracy, social studies and science are called "main subjects" and also "intellectual subjects", the learning of which relies, to a very large extent, on the acquisition of knowledge

within classrooms. The indoor learning about the "main subjects" tends to confine learning activities to rote learning and memorisation on the one hand, and to simplify the subject matters into abstract ideas (which are accessible by written words and convenient for rote learning) on the other. The other subjects, such as music, art and physical education, are called "sub-subjects", the learning of which depends on the action during the process. This division between "main subjects" and "sub-subjects" is problematic in many respects. For example, subjects are inappropriately classified as important and unimportant; what is even worse is that teachers are ranked as well. It is apparent that the division results in discrimination against and unjust views about knowledge and educators. There could be complicated cultural and social factors involved in this phenomenon. I do not aim to interrogate them in this thesis; however, what I emphasise is that, if the disenchanted view dominates education, it could foster the trend of disembodiment and result in unbalanced learning.

Some assumptions implied in the early modern scientific view of nature can be found, some of which could be traced back to premodern thought. These assumptions, fundamentally grounded on substance metaphysics, are elaborated and made explicit through the process of demystification or disenchantment. They are as follows.

1) Mechanism. Nature is taken as a machine in which all parts and motions are measured and predictable.
2) Atomism. Nature as the machine composed of the indivisible and homogeneous substances --- atoms. The view that atoms are homogeneous may be the point distinct from ancient atomism. Atoms in the ancient views might be various kinds of atoms, such as earth, water, air, fire and void. In Aristotle's view, nature is composed of heterogeneous substances which differ in their causes. This qualitative difference makes little sense in modern atomism.
3) Hierarchical dualism in epistemology. The nature learned through idealisation and mathematisation is more reliable than that learned through perceptual, empirical experience.
4) Dualism in cosmology. The fields of deity and of nature are separated. With the separation, the fields of theology and of natural science are thus distinguished from each other.

5) Mathematised realism/essentialism. The best scientific theories describe the essences of things in nature. The essences are the mathematical realities behind the phenomena. Thus the final explanation of the world is to discover the natural laws, i.e., the mathematical formula. In modern terms "A theory of everything".
6) Anthropocentric hierarchy of beings. The beings or objects in nature are ranked according to rational ability. This view is deeply rooted in the Platonic-Aristotelian intellectual tradition.

The discussion above reveals "disenchantment" as a process of forwarding the task of "rationalisation" and "intellectualisation". This process can be understood as having been initiated during the Scientific Revolution and is still underway. For educators, some questions may need more consideration: Are we happy with the way we deal with nature? Is knowledge about nature according to the scientific and disenchanted view sufficient? Is the scientific attitude towards nature that we learn from curricula appropriate? Is current learning about nature, which is strongly under the influence of this disenchanted view, as educationally meaningful as it might be?

Some drawbacks have been highlighted in the above discussions including the limited knowledge and the means or technologies of natural sciences, the alienation of nature, the tendency of disembodiment, and the narrowing reduction of lifeworld experience. These drawbacks all point towards impoverishment of meaning in learning and living generally. Viewed in this light, the disenchanted view might not be educationally desirable. We may need a different perspective to envisage nature, our attitudes towards nature and ourselves to retrieve the meanings excluded by disenchantment. Let us turn to the enchanted view.

5.2 Enchanted Nature and an Affective Attitude

The above exploration shows the problem of impoverishing meanings in education in

the disenchanted view. This section continues to interrogate disenchantment and enchantment: If the disenchanted view is not satisfactory to bring forth rich meanings for education, will the enchanted view hold more potential for meaningful education?

In general, the enchanted view assumes that, on the one hand, nature is taken as a living being and, on the other, human beings should treat nature with care, regard, feeling and respect. This perspective is very conspicuous in Romantic discourse. The following exploration is focused on Romantic ideas to reveal the meaning of enchantment and the enchanted view of nature. Yet it is important to notice that the idea of enchantment does not equate with the whole of Romantic doctrine.

First of all, although Romanticism is acknowledged as an important and broad trend of thought in the 18th and 19th century, it is still difficult to find any clearly unifying feature to justify the name of Romanticism because there are many different authors and works (Garrard, 1998). For example, it is generally accepted that Romanticism can be understood as a response or reaction towards the Enlightenment and the related modernism and industrialisation. For some, Romanticism and modernism are in tune; Stone points out that many Romantics hope to "reconceive nature as animated without jettisoning the epistemic and political values of modernity" (Stone, 2005, p. 4). In this sense, the Romantic view of human/nature relationship may not be the doctrine conceived by some contemporary ecocentrists, such as deep ecologists, spiritual ecofeminists and others. For some, Romanticism aims to defend nature and oppose modern fabrication including rationality, science and technology (Feenberg, 1999; Stone, 2005). Inconsistent views can thus be found within Romanticism. It is not monolithic.

Secondly, many Romantics take nature as an external and independent entity by claiming the intrinsic value of nature. For example, according to Garrard, Romanticism is "an unprecedented insistence on a kind of intrinsic value in nature, a worth not reducible to an instrumental calculus of resource base or agricultural potential" (Garrard, 1998, pp. 113-114). In Garrard's view, the intrinsic value of nature is the key of Romanticism. This point is suspicious to me. In my view, if we follow this light to define Romanticism, it is easy to fall into the trap of reifying nature and to base the idea of nature on the ground of philosophy of being. Some contemporary ecocentrists follow this approach to Romanticism and seek inspiration

from it to fight against anthropocentrism which is taken as a theoretical crux of environmental problems. In my view, this may be an escape from one theoretical problem by jumping into another one. Here I do not intend to discuss the debates related to anthropocentrism, ecocentrism and the value of nature at this moment. What is important to this thesis is that the Romantic understanding of enchantment is in accordance with the previous exploration of the philosophy of becoming. Then, in what sense does Romanticism inspire our understanding of enchantment in accord with philosophy of becoming? Here we put the stress on the Romantic attitudes towards nature rather than nature itself.

The Romantic attitude towards nature involves appreciation, care, sympathy and admiration; in contrast, the Enlightenment thinkers' attitude is rational, detached, indifferent and objective. Moreover, the ethos of Romanticism may include broad trends reacting or resisting disenchantment by modern scientists and Enlightenment thinkers (and very possibly as a response to the French Revolution) (Bate, 1991). Bate describes Romanticism as conveying "a respect for the earth and a skepticism as to the orthodoxy that economic growth and material production are the be-all and end-all of human society" (1991, p. 9). According to Travers (1998), the Romantics are described as rejecting "the ideas of the Enlightenment, believing that the philosophy of materialism and the principle of scientific rationality necessarily led to a mechanistic and reductionist model of human nature, which had no place for the spiritual or the transcendent. Instead, Romantic writers looked to nature, contact with which, they believed, would restore to the individual a sense of the interdependence of living things and a feeling for the organic evolution of life" (Travers, 1998, pp. 27-28). Thus we may find that the Romantic attitudes towards nature may involve social critiques.

In this thesis, I define "enchantment of nature" as "the emotional experience of appreciation, wonders and marvels at the unintelligible nature" which is, to a large extent, inspired by the Romantic view. None the less, many Romantics take nature as real divine and pre-existing, a position with which I take issue. Thus my approach to enchantment is to focus on the aspect of "attitudes" towards nature: Romantic attitudes. Therefore, the feature characterising the Romantic view of nature is defined by this thesis as a creative, inspiring, moving and inexhaustibly intelligible source, for

which human beings have sympathetic, empathetic and appreciative feelings.

Compared with philosophical argumentation, artistic or literary articulation seems more suitable to convey our sympathetic emotions towards nature and may be more appropriate for use in teaching. Many nature-caring Romantics are known by their literary works, such as Rousseau, Schiller, Goethe, Schlegel, Fichte, Shelling, Blake, Coleridge, and Wordsworth. Among these numerous Romantic poets, William Wordsworth can be seen as "the foremost Romantic prophet of nature" (Schenk, 1966, p. 162). Jonathan Bate dedicates his work *Romantic Ecology* to Wordsworth because the poet "sought to enable his readers better to enjoy or to endure life by teaching them to look at and dwell in the natural world" (Kroeber, 1994, p. 37). Raymond Williams (1973) also points out that the term "nature" is the most important word in Wordsworth's poetry. His concept of "nature" can be seen as the anchor to understand how the Romantic culture relates itself to environment, for "the word [nature] probably focuses a cultural domain of contestation and transformation. The romantic concern with nature, in fact, manifests a dissolution and reconstitution of conceptual patterns by which natural phenomena had been understood…" (Kroeber, 1994, pp. 17-18).

Therefore, the exploration of the concept of "nature" in Wordsworth's poetry is our chief orientation towards the Romantic view of nature in this section. Before explicating the view of nature in Wordsworth's works, there is another author whose thought is worthy of consideration: Jean-Jacques Rousseau. His thought ambivalently intertwines the elements of Enlightenment and Romanticism and has had great influence upon the Western intellectual legacy in many respects: as many scholars point out, he directly influences Kant, Wordsworth, Emerson and indirectly a number of contemporary environmentalists (Harrison, 1992; LaFreniere, 1990).

5.2.1 Rousseau's nature

How can Rousseau's view help us to think more about nature and education? Rousseau's thought embraces many contradictions, including his ideas about nature and human beings (Attfield, 2004; Harrison, 1992). Rousseau is well-known as a

natural philosopher. However, his idea of nature is often limited to human nature rather than natural environmental or nature as a whole; yet his view of nature or human nature is influential in later developments in natural education or child-centered education. Although his ideas of nature and education might not be exclusively original and go much beyond the scope of some other Enlightenment thinkers, such as John Locke (1975), as a bridge between the Enlightenment and the Romanticism, Rousseau still plays a significant role. Rousseau is one of the crucial figures who stimulated public interest in the issue of (human) nature and its implications for an education conforming to human nature. Hence he can be understood as illuminating the importance of child-centred education. The particular contribution of Rousseau is that he makes prominent two elements implied in (human) nature: freedom and individuality.

Rousseau's idea of (human) nature is paradoxical. On the one hand, he adopts an economic and exploitative attitude towards nature when he states,

> *One must exploit or sell the old forests which no longer profit, but one must leave standing all those that are still thriving: in their own time they will have their use. (Rousseau; cited from Harrison, 1992, p. 126)*

On the other hand, Rousseau exalts nature. (This is the point that makes Rousseau well-known.) Not only in his classic *Emile* (1962), but also in *Discourse on the Origin and Basis of Inequality among Men* (1973), Rousseau highlights the superiority of original states of nature and the corruption of human civilization:

> *It is still more cruel that, as every advance made by the human species removes it still farther from its primitive state, the more discoveries we make, the more we deprive ourselves of the means of making the most important of all. Thus it is, in one sense, by our very study of man, that the knowledge of him is put out of our power. (Rousseau, 1973, p. 43)*

We may know from the above that nature is taken as the source of norms and criteria of truth and goodness. A contrast could be found in Rousseau's view of nature. It is a

contrast between the unspoiled, pure nature and an erring, artificial corrupting society. This view of nature may not be invented by Rousseau but reflects one of the widespread notions related to nature as many Romantics thought. Implicit in this contrast is a notion of taking nature as the source of norm and order, as a German writer living in France states (Holbach, cited in Marshall, 1992):

> *Oh Nature! Sovereign of all beings! And you its adorable daughters, virtue, reason, truth! forever be our only Divinities; it is to you that are due the incense and the homage of the earth. Show us then, oh nature! What man must do to obtain the happiness which you have made him desire…*
>
> *We shall see that error is the true source of the ills of our species; that is …by taking the axe to the root of superstition, that we shall be able quietly to search for the truth, and find in nature the torch which can guide us to felicity. Let us study nature… (Holbach, cited in Marshall, 1992, pp. 227-228)*

Moreover, Rousseau's view of humanity is as paradoxical as his view of nature. In the first place, Rousseau believes that everything by its nature is good. As stated in *Emile (Book I: 10)*, "Everything is good as it leaves the hands of the author of things". Human beings by nature should be good. In this sense, education should be launched in accordance with human nature. However, in the second place, society, as the outcome of human civilisation, is the root of corruption: "everything degenerates in the hands of man" (*Emile Book I: 11*). It seems paradoxical that human beings, whose nature is good, turn into the root of corruption. However, the conceptions of individuality, society and nature may be the pivot for elucidating the paradox. In Rousseau and many other Romantics' perspective, nature is the norm and standard of goodness; every individual is good by nature. What causes degeneration is the "collective man", "society" or "civilisation". In more accurate terms, it is the collective man causing rottenness. The reason why many good individuals compose a corrupt society is not the focus of Rousseau's thought. However, nature may provide

the reference of education for goodness. This point seems to be shared by many Romantics including Wordsworth. Moreover, another solution for Rousseau may be the request for "a political intervention within society to create new political forms which allows the recovery of qualities, such as empathy and cooperativeness, which existed when men were closer to the state of nature" (LaFreniere, 1990, p. 48). The political resolution may go beyond the scope of this thesis and thus it is suspended.

Many authors point out that the view of nature in Rousseau is significantly consonant with that of Wordsworth who in turn greatly influences the Romantic tradition in environmentalism (Harper, 1923; LaFreniere, 1990; Quennell, 1970).

5.2.2 Wordsworth's nature

Having deep and great influence on contemporary environmentalism and child-centered education, directly or indirectly, Wordsworth's view is a very important reference for exploring the Romantic view of nature. It reveals that the Romantic view of nature includes the following characteristics: unpredictability, uncontrollability, inexhaustibility and the power of inspiring rich meanings. The exploration of Wordsworth's thought will make prominent the important Romantic concepts including individuality, liberation and affectivity and morally instructive meaning in nature. We can find an interesting consonance and dissonance between Romanticism and Enlightenment thought; however, both play important roles in present educational theories and practices.

Nature in Wordsworth's and other Romantics' works seems to be a persistently recurrent theme. For many, Wordsworth's works are acknowledged as the most significant epitome of the Romantics' view of nature. For example, some authors regard Wordsworth not only as a nature poet but also as a proto-ecologist (Bate, 1991; Garrard, 1998). We may find some connections between contemporary ecological thinking and Wordsworth's ideas. The poet's view holds much potential for envisaging education about nature as education from nature.

Next, let us take a deeper look of the poet's view of nature. Wordsworth's view can be explicated in the following five points:

The first point is related to a prevalent feeling among Romantics against the industrialisation and urbanisation which embody the substantially socioeconomic, scientific and technological changes intertwined with the notion of disenchantment. This feeling and the implied critiques towards modernisation and technologisation for us contemporaries are still significant. Compared with the time of Wordsworth, our world and nature have been drastically and irreparably changed. As described in *The Excursion (Book XIII):*

> *...An inventive age*
> *Has wrought, if not with speed of magic, yet*
> *To most strange issues. I have lived to mark*
> *A new and unforeseen creation rise*
> *From out the labours of a peaceful land*
> *Wielding her potent enginery to frame*
> *And to produce, with appetite as keen*
> *As that of war, which rests not night or day,*
> *Industrious to destroy!*
> *(Wordsworth, 1888,* http://www.barletby.com/145/*)*

Laments for ongoing changes and loss of familiar things can be heard throughout the words above. They are described by Raymond Williams (1993, p.127) as "feelings of loss and melancholy and regret". For educators, it is a reflection from deep inside: What kind of a world do we desire? What kind of nature can bring educators and learners to approach the desirable world and thereby be worth teaching? The reflection brought by the first point is related to the second one.

Secondly, nature may be taken as the source of redemption for human beings to be liberated from the frame of city life and the ravage of social changes. On this view, a nature worth learning can be a source; this source can inspire a sense of tranquility and freedom. As Wordsworth (1888; 1984, p.375) depicts in *The Prelude (Book I: 6-8)*: "A captive greets thee, coming from a house/ Of bondage, from yon City's walls set free,/ A prison where he hath been long immured." None the less, nature does not only provide the shelter for human beings to be liberated from the psychological

shackles of modern life;[36] it is also the source of order, goodness and knowledge. From the experience and contemplation of nature, the poet acquires aesthetic enjoyment and feelings of peace and freedom. The experience of nature is the root of poetic creating in many Romantic writers. Wordsworth's *Prelude (Book I: 41-54)* echoes the above view (Roberts & Gifford, 1998, p. 168):

> *For I,… felt within*
> *A corresponding mild creative breeze,*
> *A vital breeze … is become*
> *A tempest, a redundant energy*
> *Vexing its own creation. 'Tis a power*
> *……*
> *Brings with it vernal promises, the hope*
> *… and thought,…*
> *Pure passions, virtue, knowledge and delight,*
> *The holy life of music and of verse. (Wordsworth, 1888; 1984, p.376)*

Nature has been bestowed with high esteem by the poet for it inspires creativity on various levels including the physical, imaginative, emotional and artistic.

For educators, the aforementioned two points are still significant. The levels of industrialisation and urbanisation at present are intensified; environmental degradation is increasing. Somehow the poet's laments should be heard to alert ourselves to the unexpected changes brought about by modern science and technology. This attentive ethical attitude should be included in our education.

Thirdly, a harmonious human/nature relationship is conceived. It seems a paradox that, on the one hand, human beings and nature are taken by Wordsworth as an integrated whole; on the other hand, the individuality of human beings is highlighted. The ecocentrism and anthropocentrism, or holism and individualism are both included in Wordsworth and many other Romantics' view. The ideas of observance of nature and of the Great Chain of Being develop into a holistic view in

[36] As many authors point out, although the Romantics criticise the modern way of life, very few of them could abandon the modern lifestyle (Coates, 1998). Thus, the modern problems of modern life are basically psychological, not physical.

the works of the other Romantics including Coleridge, Blake and Shelley (Kroeber, 1994). In this view, the relationship between humans and nature is oneness, unity, harmony and interdependence. For example, the intense feeling for nature expressed in *Tintern Abbey* reveals that Wordsworth's feeling for nature is not merely an appreciation of landscape but also a communion and integration with it. As Wordsworth (1888) depicts: "Therefore am I still/ A lover of the meadows and the woods,/ And mountains; and of all that we behold/ From this green earth; of all the mighty world/ Of eye, and ear, --- both what they half create,/ And what perceive;…" A very strong intimate and close relationship between nature and the poet can be read from these lines. This relationship is inseparable from and embodied in the poet's sensations.

Some critics such as Marshall (1992) and Kroeber (1994) point out that there is a view of pantheism and mysticism implied in Wordsworth's poetry. For another example, Coleridge (2005) shares the general concept of nature with Wordsworth: "O the one life within us and broad,/ Which meets all motion and becomes its soul,/A light in sound, a sound-like power in light,/ Rhythm in all thought, and joyance everywhere ---/ Methinks, it should have been impossible/ Not to love all things in a world so filled;……And what if all the animated nature / Be but organic harps diversely framed,/ That tremble into thought, as o'er them sweeps/ Plastic and vast, one intellectual breeze,/ At once the Soul of each, and God of all?" (Coleridge, 2005, *The Eolian Harp*: pp. 26-30; pp. 44-48)

We may find that the poetry above attempts to encapsulate the organic and inseparable interrelationship and intimacy between human beings and nature. Insofar as human beings are one part of nature, human beings, by (human) nature, can and should approach towards nature in a reciprocal way: the communion with nature is to rejoin the whole which one belongs to. The most important point for educators is that, according to Wordsworth, nature and human beings should be consonant, harmonious and mutual. If human beings give their attention to this interrelationship carefully, human beings can learn from nature. Nature is the nurse, the anchor, the guide and the guardian of human beings.

…well pleased to recognise

In nature and the language of sense,
The anchor of my purest thoughts, the nurse,
The guide, the guardian of my heart, and soul
Of all my moral being.
(Wordsworth, 1888, http://www.barletby.com/145/*)*

Nature for the Romantics is the object to be devoted to, identified and involved with, and the root of criteria of ideas and practices as well as teacher. The way that nature teaches is to invite us to be attentive, receptive and responsive to our inner world, nature and their interrelationships. This point makes prominent the difference between the Romantics and the Scientific Revolution and the Enlightenment modernists: as mentioned, for modernists, nature is what human beings want to control; by contrast, nature is what the Romantics wish to learn from. In this sense, the Romantics' nature is enchanted through reunion; in contrast, the Enlightenment's disenchantment is to separate human beings and nature. None the less, the confrontation between disenchantment and re-enchantment does not imply the Romantics' sheer renunciation of Enlightenment thinkers' notions; both groups agree on the ideas of human individuality and potential emancipation. Their difference may consist in different views about the relationship between individual, society and nature.

The fourth point is related to human nature, which can be drawn out of the integrative and harmonious human/nature relationship. On this point, Wordsworth and Rousseau have a similar view. They both take humanity as innately good. It can be revealed in the following poems: *My heart leaps up when I behold* and *Ode: Intimations of Immortality from Recollections of Early Childhood*:

The child is the father of the man,
And I could wish my days to be,
Bound each to each by natural piety. (Wordsworth, 1984, p.246)

Our birth is but a sleep and a forgetting:
The Soul that rises with us, our life's Star,
Hath had elsewhere its setting,

And cometh from afar:
Not in entire forgetfulness,
And not in utter nakedness,
But trailing clouds of glory do we come
From God, who is our home:
Heaven lies about us in our infancy! (Wordsworth, 1888)

Here we may find a shade of Neo-Platonism in these words: a divine whole includes and is partaken of by all. This divine principle can be found in nature and human beings. Human beings might forget about the divinity because of worldliness. Since children are less "contaminated" than adults, they are "purer". In this sense, education is to learn from children so that their "naturalness" could be kept and preserved. Here Wordsworth seems to hold Rousseau's view that the divine and pure human nature is more easily to be found in children than in adults because it is likely to be contaminated or corrupted during the process of growth. We may find that a view of child-centered education has its root in the Romantic soil.

The last point is that Wordsworth shows deep regard for animals or non-human beings. This view directs humans to reevaluate the moral status of animals which, traditionally, have hardly been taken into moral consideration. There was a growing interest in animal welfare in the eighteenth century. Many Romantic poets reproach hunting for inflicting suffering on animals in the 18th century (Mortensen, 2000; Perkins, 1998). In some sense, the new attitude towards animals embodies the reconceiving of the human/nature relationship. In many poems Wordsworth expresses deep sympathy with non-human beings and thereby shows the opposition to hunting, especially in the poem *Hart-Leap Well* (Mortensen, 2000; Perkins, 1998). There are two parts in this poem: the former delineates the story of hunting from the hunter Sir Walter's perspective; the latter depicts it from the shepherd's mouth. Although the first part of this poem does not highlight the suffering of the hunted hart, the scent of reflectiveness against hunting can be read from the lines:

The poor Hart toils along the mountainside;
I will not stop to tell how far he fled,

Nor will I mention by what death he died;
But now the knight beholds him lying dead.

Dismounting, then, he leaned against a thorn;
He had no follower, dog, nor man, nor boy;
He neither cracked his whip, nor blew his horn,
But gazed upon the spoil with silent joy.

Upon his side the Hart was lying stretched:
His nose half-touched a spring beneath a hill
And with the last deep groan his breath had fetched
The water of the spring were trembling still. (Wordsworth, 1888; 1984, p.169)

The words above censure the cruelty brought from hunting in an emotion blended with seriousness and calmness. On the one hand, Wordsworth reproaches the hunter for his cruelty and ruthlessness. On the other hand, the suffering of the animal is highlighted. This point may remind us of the opposite view of one of the founders of modern thinking: Descartes, who denies animals' ability to feel pain (Regan, 1983; Singer, 1975). None the less, this view, implying a new conception of animals as moral subjects, is deeply consonant with that of some contemporary advocates of animal rights (Mortensen, 2000).

The second part of this poem elaborates the sympathy for animals in clearer and deeper delicacy. There is a huge contrast between the attitudes towards animals of Romantics and modernists. For example, the 18th century French philosopher N. Malebranche describes animals as follows: "They eat without pleasure, cry without pain, grow without knowing it; they desire nothing, fear nothing, know nothing" (cited in G. P. Harrison, 1992, p. 219). R. Descartes has a similar notion that animals are automata, without sense of pain. Viewed in this disenchanted light, animals do not need to be treated with feelings because they do not, cannot and will not "feel". By contrast, Romantics embracing an enchanted view show feelings towards animals. As Wordsworth depicts:

Some say that here a murder has been done,
And blood cries out for blood: but, for my part,
I've guessed, when I've been sitting in the sun,
That it was all for that unhappy Hart.
……
One lessen, Shepherd, let us two divide,
Taught both by what she shows, and what conceals;
Never to blend our pleasure or our pride
With sorrow of the meanest thing that feels. (Wordsworth, 1888, http://www.barleyby.com/145)

At the end of the poem, Wordsworth expresses sentiment and compassion for the other beings, which is a pivot for reconsidering the relationship between humans and animals and the implying ethical issues. Here arises a question which is related to human nature, ethics and education: if human beings are beings with morality or moral sense, can this morality allow other creatures to suffer and ignore their feelings and pains? Can we exclude animals from our value system or morality? For us educators, Wordsworth poses a question which sets a starting point for educating for the care of animals by means of senses.

Wordsworth's poetry offers the inspiration of what and how to learn animal ethics: curriculum and pedagogy. Both, in some respects, seem at odds with the Enlightenment approach to education. For the latter, animals are non-rational or irrational species so that they are not included as participants in moral participation. In addition, senses are not to be taken as the main means of learning for they result in vagueness, inaccuracy and mistakes. One of the important goals of the Enlightenment approach to education is to raise the ability of using reason deliberately and acutely to efface the ambiguities and errors caused by senses. Nevertheless, the Romantic orientation of education takes a path opposite to the Enlightenment way. It is interesting to find that this Romantic educational path is in tune, in certain respects, with postmodernism; this will be argued in the later chapters.

The important point is that the meaning of nature of Romanticism is multiple,

complicated and even inconsistent among different Romantics. However, some interesting points can be drawn out from the Romantics' view of nature.

Firstly, the Romantics view anticipates ecological thinking: nature is conceived in a holistic view; there is reciprocity and interrelationship between all beings with and within nature. Marshall gives an acute description of Romanticism that "paved the way for a genuinely ecological sensibility which recognizes the one in the many, the interdependence of humanity and nature, and the reverberating harmony of the universe" (Marshall, 1992, p. 297).

Secondly, the Romantic view orients a moral thinking within which non-human beings are included not merely as instruments but as moral touchstones by showing the feelings and suffering of animals.

Thirdly, this view calls for attentiveness towards various experiences of nature. In this enchanted view human beings can perceive themselves as one part of and belonging to a whole. The Romantic feeling of belongingness reminds us of the premodern philosophers' cosmological view. I have pointed out in the previous discussion that the exploration of the premodern view might help human beings to imagine ourselves as one small part situated in the vast and remote cosmos. This feeling of being an ancient cosmological thinker may help us to learn an ethical attitude to be modest and respectful towards our world. Learning as a premodern cosmologist can be seen as analogous to the Romantic feeling of belongingness in nature: to be a "naturalist" --- "a natural human being in nature". This belongingness is a means of resisting the alienation of human beings from nature due to disenchantment. The human imagination, creativity and emotion for the other beings and the world are inspired by nature. In this sense, nature is the source of inexhaustible inspiration, reflection, innovation and creation for producing numerous artistic, literary, philosophical, spiritual and ethical works.

There may be, however, some limitations in the Romantics' view. The first is the anthropomorphist belief or the "pathetic fallacy" (Marshall, 1992, p. 273). Secondly, although Romanticism is known as a revolt against the Enlightenment, yet the two cultural trends share some common notions such as humanism and individualism. The pursuit of human individuality and individual freedom seems to be a continuous theme in Romantics' works, such as the Romantics' poetry, novels and the German

idealists' philosophical works (Kroeber, 1994; Marshall, 1992).

5.3 Summary

After all the discussions of disenchanted and enchanted views of nature, we may think about how they can be helpful for improving curriculum. Can they help to extricate our current curricula from the pitfall of over-simplifications? Can both views be helpful or only one of them? What difference will these two views of nature bring to education? Which view is more helpful for re-conceiving educational ideas and practices? Finally, which view is more educationally meaningful and desirable? Accordingly, let us first of all examine what difference could these two views bring to educational ideas and practices.

1) On the educational subject

On this point, we may find that an independent, free and autonomous individual is the human image as a goal of education which is approved by both disenchanted and enchanted views. Yet this autonomous individual from these two views has very different attitudes towards nature: for the disenchanted wing, the most important task of education may cultivate a pupil as an enlightened and independent individual, capable of controlling and making good use of our earth; for the enchanted wing, it might be an affective person with attachment, feelings and belongingness in nature. To be fair, the cultivation of a rational and autonomous individual is equally important as an affective, attentive and caring person in education. The problem in current education is the unbalanced underestimation of the Romantic enchanted personality and overestimation of the Enlightenment disenchanted ego.

2) On the curriculum

The disenchanted view focuses on the field of sciences or the fields

modelling natural science to meet the criteria of "rigorousness", "technologisation", "standardisation" and "methodisation". Educators embracing this view tend to choose and provide standardised and normalised materials for pupils. For policy-makers holding the disenchanted view, educational development should meet the requirements of "Science" to become a profession, thus various modern techniques, including technologisation, institutionalisation, bureaucratisation and professionalisation are the models for conducting educational theories and practices (Carr, 1997). In some respects, educators taking the disenchanted view tend to evaluate learning materials with the following criterion: curricula that are appropriate for learning or teaching about nature can provide knowledge that can maximise and optimise efficiency and performativity in exploiting nature. We may find that the demand for "Science" is in line with, or may be seen as an initiative of the over-simplifications of the present curriculum mentioned before: homogenisation and disembodiment. Viewed in this light, the over-simplifications of the current curriculum can be understood as the legacy of modern thinking. However, the most important point is that learning of the useful and efficient may not be the only means for bringing meaning to life.

The enchanted view tends to focus on learning subjects such as literature and art. Educators having deeper belief in this view are prone to take curricula in which it is easier to express subjective feelings and emotions in teaching. These subject matters may not easily meet the criteria of "Science" including measurability, standardisation and mathematisation. In some respects, the learning that matters to the advocators of the enchanted view is not how to make good use of nature, but rather how to learn from nature in order to inspire more meaningful connections with nature. This approach to learning might be helpful to avoid the pitfalls caused by the disenchanted view and bring forth more variety in the contents and the means of education and thereby beget more choices and richer educational experience.

3) On education about nature

The disenchanted view implies a hierarchy of human beings and non-

human beings. The knowing subject as a credible agent consists in its ability to measure, to reason, to calculate and to find "the" "truth". None the less, many authors (Horkheimer & Adorno, 1972; Husserl, 1970; Kheel, 1995; Merchant, 1992, 1995; Rorty, 1993b; Spretnak, 1997, Warren, 1995) point out that this idea of rationality, which is taken as the criterion to distinguish humans from non-humans, is very likely to result in a danger of brutality of discrimination, and even violence. According to Warren (1995), this view is a certain dominant framework of mind, incorporating various forms of domination including human over nature, men over women and the West over the non-West.[37] The notion of rationality is understood in terms of technical or instrumental rationality only and becomes dominant (Habermas, 1971). This rationality can be used as a totalitarian instrument to discriminate rational from irrational beings and then to exclude the latter (Habermas, 1971; Horkheimer & Adorno, 1972; Rorty, 1993b). Scientific rationality is taken as the only useful and efficient tool for attaining knowledge and the only criterion for judging. Based on this, the Romantic calling for re-enchantment of nature can be understood as a very humane request.

Against the disenchanted view, Romantics highlight the unpredictability and inexhaustibility of nature for its inspiring human beings to have highly spiritual, emotional and intellectual experience, e.g. the experiences of beauty and the sublime. Thus, nature is a source beyond human recognition, imagination and controllability. It is nature that orients and initiates human creativity and meaningful experience. Nature in this sense is re-enchanted. Human beings participate in, rather than subjugate nature. As one part of nature,

[37] Some ecofeminists (Kheel, 1995; Merchant, 1992; Spretnak, 1997, Warren, 1995) name this dominant framework which originates from modern thinking, e.g. Newtonianism, as "masculine spirituality". They attempt to find the resolution from nature but bestow the feature of femininity on nature. In their mind, the feature of "Mother Nature" could be found in premodern or indigenous societies. As a possible source providing a certain resolution to the predicament caused by modern thinking, "Mother Nature" could be learned from these societies or cultures. However, some authors point out that people in premodern times had already converted the wilderness into controlled agrarian fields by way of the unsophisticated technology of windmills, drainage and sluices. Since the "substantial environmental modifications do not require the legitimation of a mechanistic world-view" (Coates, 1998, p.77), it may not be fair to claim that human control over nature is one of the features of modernity. Moreover, as Keller (1988, p.64) points out, "patriarchy is not essentially modern, for it long predates modernity"; it may be appropriate not to take men's domination over women or the masculine spirituality as the distinguishing characteristic of modern thinking.

> human beings are interrelated and interconnected with all the other beings within nature. On this ground, the Romantics claim that the objects of human feelings, moral sensibility and responsibility should be extended to include non-human beings. The most interesting point is that the Romantics make an important distinction between individual and collective human beings to explain the cause of the corruption: every individual by nature is good but degenerates when he or she is posited in a collective. In my understanding, the Romantics perceptively point out that loss of individuality, or in a more specific term, of heterogeneous individuality, could be the origin of degeneration. The communion with nature as the lifeworld experience is one of the means to resume one's own personal individuality. It is the starting point for practising natural education: learning from nature; as Wordsworth (1984, p. 131) states, "Let nature be your teacher".

All in all, we may find that the disenchanted and enchanted views are both inspiring and important for education. Yet the Romantic enchanted view is unjustly underestimated in curriculum while the disenchanted view is overemphasised. This unbalanced perspective in education has been taken for granted and has not been under scrutiny. This neglect results in over-simplifications in present curricula. Therefore, emphasis on an enchanted view in education may balance the existing unjust and over-simplified curriculum. The Romantic enchanted view reminds educators of the significance of the ideas, such as interaction and interrelationship between humans and nature through the experiences of affectivity, emotion, sentiments and affiliation, which have been undervalued. Viewed in this light, the enchanted view is helpful for enriching and improving education.

Yet two points need notice when the Romantic enchanted ideas are adopted in education.

The first challenge to Romanticism is that it is often taken (or mistaken) to be related to sentimentalism, emotionalism and irrationality. The sentimentality of Romanticism was liable to turn into "windy vapourings and self-indulgent whimperings" (Marshall, 1992, p. 296). Some works seem to encourage a "morbid concern for decay…a deep discontentment with one's lot which did not always

translate itself into action, a mysterious melancholy, an inexplicable longing for another shore" (Marshall, 1992, p. 296). For example, Keats lamented being "half in love with easeful death" (cited in Marshall, 1992, p.296). I do not deny that it is possible for Romanticism to result in sentimentalism and irrationalism if it is inappropriately overemphasised. However, it is not proper to take an either-or, polarized thinking perspective to ground education. Any exclusively singular, one-sided view of education could lead into the crisis of oversimplification, whether it be a disenchanted or an enchanted view. Thus here I emphasise the potential inspiration that the Romantic enchanted view can bring to education, it does not mean that I want to banish the disenchanted view from curriculum and education. The point is that a balanced evaluation and inclusion of both views in education can be more helpful for developing a meaning-rich curriculum than an unbalanced view.

The second challenge is about the connection between Romanticism and totalitarianism. For example, the Nazis used the words of Herder and Nietzsche out of context and the ecological sensibility implied in Romanticism was also used by the Nazis as one of the roots of German ecologism (Biehl & Staudenmaier, 1995; Marshall, 1992). However, we may argue that the totalitarian approach undermines Romanticism by the elimination of the most significant element of this doctrine, viz., heterogeneous individuality. Moreover, it is, in my view, to a great extent, caused by the reification of the ideas and values that are highly esteemed. This point will be argued in Chapter 6. Indeed, what makes Romanticism valuable is its esteem of freedom and individuality, which are exactly contradictory to totalitarian values.

A free and autonomous individuality may be a common idea shared by the disenchanted modern thinkers and enchanted Romantics although they attempt to interpret it on different levels. For the disenchanted modern thinkers, what distinguishes the individual is autonomous rationality, for the Romantics affectivity. On the level of the human/nature relationship, the individual is taken by the disenchanted thinkers as the centre or core of nature, by the Romantics as one integrative part. Nature for modern thinkers is an indifferent object, for the Romantics an inseparable co-existence. For us, a learning about nature with feelings as well as with reason can bring more meanings into our experience than a learning only stressing rationality. Learning without heart, in some sense, is to learn to be machine-

like. If animals had been devalued as automata because of their being (mis-)taken as lacking feelings, nowadays we human beings have a convincing reason not to learn to be automata: we have feelings and we can enrich our lives by learning about deepening and widening our feelings --- our value-perspectives. An enchanted orientation towards education, without completely ruling out the disenchanted view is desirable for many reasons.

6

Anthropocentric or Anthropo-non-centric?

After exploration of the meaning of nature in relation to metaphysics, the idea of the *telos* of nature and the issue of dis/enchantment, these further enquires arise: What kind of human/nature relationships could be inferred from the previous discussions? What inspirations could the related human/nature relationships bring to education? I will argue in this chapter that the anthropocentric view, a very prevalent and yet contentious idea in the fields of environmental ethics, sciences and (post)modernist theory, is more related to the philosophy of being, the view of nature with divine *telos*, and the disenchanted view than to the philosophy of becoming, the view of nature with non-divine *telos*, and the enchanted view. The latter group of ideas could be taken as grounds for conceiving a new alternative to anthropocentrism: I call it anthropo-non-centrism. This chapter will argue that anthropo-non-centrism challenges the traditional understanding of the human/nature relationship by re/construction. Following this, anthropo-non-centrsim may shed new light on education.

Let me first introduce and define, in brief, the concepts of anthropocentrism and anthropo-non-centrism used in this thesis. The concept of anthropocentrism and the related environmental discourse have received much notice since the 20th century partly because of rising environmental concerns. In general, anthropocentrism is understood as one of the most crucial intellectual cruxes of human/nature relationships and the resulting environmental problems (Griffin, 1988a, 1988b, 2000; Merchant, 1992; Nash, 1989; Oelschlaeger, 1991; Purser, Park & Montuori, 1995; White, 1967). Its underpinning philosophical ideologies are generally agreed as modernism and Enlightenment humanism. In order to deal with environmental

problems by changing the way of thinking, decision and action, many authors attempt to find theoretical antidotes from the wing of counter-discourses such as biocentrism, ecocentrism, deep ecology, and so on. Since modernism is taken as an important pillar of anthropocentrism, the counter-thoughts of modernism, including premodern and postmodern positions, are taken as possible sources of remedies for improving the disorder caused by anthropocentrism.

In chief, this thesis argues that anthropocentrism which has been severely criticised is a so-called strong anthropocentrism, underpinned by the mentioned disenchanted view, theistic hierarchical view of beings, and philosophy of being. Many authors (Leopold, 1949; Naess, 2005; Oelschlaeger, 1991; Purser, Park & Montuori, 1995; White, 1967) assert that the strong anthropocentrism legitimises, to a very large extent, human abuse of nature. This attitude or spirit is implicit in the school curriculum. It is taken for granted, unseen and so powerfully conveyed to pupils without much consideration or even awareness. In some respects, anthropocentrism thus creates the pitfalls of our curricula. However, I am not fully convinced by the appeals of some authors to the so-called opposite --- ecocentrism or biocentrism. Some of the reasons have already been revealed above. In my view, ecocentrists and anthropocentrists face a similar trap of thinking: a trap which is to take a certain "centre" as a necessary condition for doctrines and practices. The crux of anthropocentrism lies not in "anthropo-" or "human" but in "centrism". Thus eco-"centrism" or any other "centrism" might not provide very proper clues for finding a solution to the predicament caused by anthropo-"centrism". Moreover, granted that anthropocentrism and ecocentrism can be taken as polarities, they both run the risk of reification: one is to reify the idea of humanity, the other the idea of nature or ecosystem. This will be explicated in the following section. On this ground, I thus propose the concept of "anthropo-non-centrism" as the perspective resisting the idea of human self-arrogance. Anthropo-non-centrism, which is in tune with our desirable views of nature discussed previously (philosophy of becoming, the concept of nature with non-divine *telos* and the enchanted view), may hold more potential to extricate human/nature relationships from the bounds of "centrism" and improve our present curricula.

It will be argued that an anthropo-non-centric human/nature relationship might inspire more possibilities for education than the anthropocentric view because there is no longer one and only one centre as a totalising move to understand human beings and nature; more perspectives could be included in education. The exploration of this chapter will demonstrate that anthropo-non-centrism may bring forth a perspective of human/nature relationships with less dominance and hubris but more deliberation, attentiveness and sense of responsibility than anthropocentrism. Viewed in this light, the anthropo-non-centric human/nature relationship could be more helpful to improve human/nature relationships and increase and enrich the meanings of education.

6.1 Anthropocentrism and Nature

This section is going to clarify the meaning of anthropocentrism and discuss the idea of intrinsic value of nature which has been taken as a key idea opposing anthropocentrism: ecocentrism. The discussions will problematise and question the ecocentric idea of intrinsic value of nature and point towards an alternative of anthropo-non-centrism to replace anthropocentrism and ecocentrism. This will be explicated in the next section.

There have been numerous discussions of the idea of anthropocentrism. For example, Nash (1989, p. 10) defines anthropocentrism as taking human beings as "the measure of all value". Eckersley (1992, p.51) defines it as "the belief that there is a clear and morally relevant dividing line between humankind and the rest of nature, that humankind is the only principal source of value or meaning in the world". Many authors point out that the term "anthropocentrism" is used to highlight the difference between human beings and non-human beings (especially animals) and legitimise the status of human beings as moral agents (Braun, 2004; Grey, 1993).

Anthropocentrism can be recognised as taking human beings as the "centre" of the world and justifying human mastery over nature and all nonhuman beings. The supremacy of human beings can also be understood as a self-arrogance or hubris

because human beings take themselves as the most important organisms in the world. In this view, the other living beings and nonliving beings are, of course, less important. Anthropocentrism is thus criticised by Nash (1989) as human chauvinism or speciesism. However, what causes human beings to take themselves as the highest and most important creature in nature? What causes human arrogance when faced with the other beings in nature? What justifies human beings as masters of nature? The previous explorations have revealed that anthropocentrism is in some respects highly related to the following different notions: the philosophy of being, the view of nature with divine *telos*, and the disenchanted view.

In chief, the three philosophical notions above collaborate to outline, on the one hand, nature as a predictable, controllable, and submissive machine and, on the other, human beings as the highest beings in nature with the privileged rationality approved by God. Rationality is the ability exclusively possessed by human beings; moreover, it is a privilege approved by the divinity. The philosophy of being contributes to the interpretation of a reality of nature composed of atoms in accordance with mechanistic laws; on this view, everything in nature is fixed, stable, determined, understandable, predictable and controllable by a certain mind --- by deity or human beings. Nature, in this view, is often taken as something that could and should be under mastery of deity and humans. Here we can find reinforcement of the conception of nature with divine *telos.*

The conception of nature with divine *telos* privileges human rationality and thereby legitimises human supremacy. Rationality is taken as an all-embracing and exclusive human talent; it is all-embracing because it penetrates everything in nature and attempts to grasp the essence; it is exclusive for no living beings in world except humans can possess it. By means of rationality, human beings achieve "Science" as an absolute, autonomous, objective and universal discipline of knowledge to help human beings demarcate human and non-human worlds, to define human beings themselves as superior to the other beings, to justify human mastery over other beings. Meanwhile, the disenchanted attitudes towards nature are encouraged and reinforced.

In education, the disenchanted view enhances an objective, indifferent and emotionless attitude towards nature in the name of "Science". These views encourage human sovereignty and hubris; in short, all the above ideas consummate an arrogant

anthropocentric view of the human/nature relationship. The anthropocentric orientation of education tends to take for granted human mastery over nature, human self-arrogance and hubris, and human beings as the only criteria of all things and all values in the world. Its adherents tend to convey them, largely unseen to pupils through curriculum without much consideration or examination. An anthropocentric view takes nature as an available, controllable and exploitable resource, a reservoir.

Many anthropocentric authors and educators are aware of the relationships between environmental problems and anthropocentrism; they assert that improvement and making "good" use of technology, an idea based on anthropocentrism, can solve the tension between environmental problems and anthropocentrism. Granted that technology plays a very crucial role in this tension, the development of more environment-friendly technology and education may be important for improving environmental problems. What needs notice is that this technological approach is based on anthropocentric thinking which can be very limited and needs to be criticised in-depth. The technological approach is only an expedient solution for alleviating the environmental crisis; it cannot undo the meaning-poverty in education caused by anthropocentrism. This view and its implied hubris towards nature could still exert great influence on education to transmit prodigal and reckless practices and institutions even when people intend to make "good" use of nature. If anthropocentrism is taken as a basic assumption and the ways to solve the shortcomings caused by it can only be contrived under this framework, the possibilities of conceiving alternative human/nature relationships may be reduced. The human/nature relationships could be impoverished. Thus I do not deny the importance of seeking more environment-friendly technology in practice; but this does not mean that anthropocentrism should be taken as the only perspective on conceiving and educating in human/nature relationships.

These problems related to anthropocentrism include not only those which are related to the three underpinning views of nature and have been mentioned in the previous chapters, but also those concerning values and ethics.

According to many authors, such as Aldo Leopold (1949) and Arne Naess (2005), the meaning of nature on the anthropocentric account is poor because anthropocentrism devalues nature and takes nature as an "object" which, as mentioned,

is “merely a machine” and an instrument. Against this, they assert the intrinsic value of all beings in nature. This belief is called “universalism” or “ecocentrism” (Weston, 1996; Nash, 1989). From the perspective of universalists or ecocentrists, the value of nature is not merely instrumental but an end in itself, as an objective and intrinsic value. For these authors, there is an intrinsic value in nature. For example, Leopold (1949) describes “land ethics” as an ethics that “simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively, the land”. Leopold’s view obviously takes non-human beings as participants in the moral sphere, implying that human and non-human beings have moral values. Naess (2005) also claims that, “The well-being and flourishing of human and nonhuman Life on Earth have value in themselves (synonyms: intrinsic values, inherent values). These values are independent of the usefulness of the nonhuman world for human purposes.” (2005. p. 40) Moreover, these proponents of intrinsic value of nature take this idea as the test of the legitimacy of environmental ethics. As J. B. Callicott (1995) states, “how to discover intrinsic value in nature is the defining problem for environmental ethics. For if no intrinsic value can be attributed to nature then environmental ethics is nothing distinct. If nature, that is, lacks intrinsic value, then environmental ethics is but a particular application of human-to-human ethics”. Following these ecocentrists’ comments, the idea of intrinsic value of nature seems to be taken as key to bring forth more and richer meaning for education. None the less, before we attempt to answer this question “Does nature with intrinsic value bring more significant and richer meanings to education than without?” we need to think about the question first: “Is there any intrinsic value of nature?” or “Can the value of nature exist in itself?”

There are many supporters of the idea of intrinsic value of nature: many authors including Holmes Rolston III (1989a, 1989b), Callicott (1995), and Bonnett (2003) argue for the intrinsic value of nature. According to Bonnett, the intrinsic value in nature, a value in itself, lies in the “naturalness” of nature including the features of nature as self-arising and as origin inspiring numerous human experiences of its values. On this point, a similarity can be found between Bonnett and Callicott: they both attempt to justify the value of nature as intrinsic by integrating Rolston’s ideas. Callicott (1995) makes more efforts to develop a “postmodern account of intrinsic value”. Callicott argues that the critical core of postmodernism is the decentring or

deconstruction of the Cartesian subject. Based on this point, Callicott argues for the theory of intrinsic value whereby values as potentiality are actualised by situated valuers. This is suspicious to me. If a value is constructed during the process of interaction of valuing subject and the valued object, it is not appropriate to call that value intrinsic.

As Callicott (1995) cites, *Merriam Webster's Collegiate Dictionary* defines "intrinsic" as "belonging to the essential nature or constitution of a thing"; then it seems reasonable to define "intrinsic value" as "the value belonging to the essential nature or constitution of a thing". Following this, I have two reasons to deny the existence of "intrinsic value". First, it is debatable that whether there is any essential nature or essence of a thing. According to the previous discussion, this thesis takes a viewpoint of philosophy of becoming which casts doubts on immutable, unchangeable and fixed ideas, concepts and essences. If the essence of a thing is doubtful, it is doubtful for this thing or entity to have any intrinsic nature or property, be this thing or entity a stone or a human being or an animal. Secondly, a "value" may not be any objective property but a concept bestowed by a valuer; this idea can be a subject-dependent concept. It cannot exist on its own. That value is subjective or relational does not mean that it is arbitrary or deceptive.

Even if we follow the views of Callicott and Rolston, value is determined, evaluated and located in context; it does not exist purely in and of itself. In addition, drawing on Rolston, Callicott points out that deconstruction of meaning does not occur only on the concept of value but also on the valuing subject him/herself because both are contextualised. If the valuing subject and the valued object can both be deconstructed, apparently so can the "value". On this ground, no value is intrinsic and exists in itself; any value is bestowed on the object during the process of evaluation by one or more subjects. The existence of the object valued is different from the value itself; thus, it is one thing to admit the possibility of the existence of nature, whether it be raw material or intelligible, and another to take it as having internal value as intrinsic to it. On this account, there is no intrinsic value in nature. In addition, it does not mean that nature is totally fictional; it is just not "ready-made" or "ready-to-learn" as it is.

Now, it seems that our enquiry for solution to the anthropocentric predicament returns to our original question but moves forward one step: Since the meaning of nature evaluated and educated is limited from the anthropocentric perspective, is there any other perspective that can provide richer meaning for life and education without holding the ecocentric or universalist idea of intrinsic value of nature?

It has been shown from the above discussions about intrinsic value that the role of humanity as a valuing subject is ineffaceable; in other words, humanity as an epistemic or perceptive agent in the understanding of nature or world is ineradicable. In some respects, anthropocentrism can be criticised but not totally denied. Therefore, the true problem is: How can human beings understand nature without taking themselves as the ultimate centre of the construction of meaning? How can human beings deal with nature without reckless and excessive exploitation of nature?

For some authors, such as Andrew Light (2000), Bryan Norton (1984) and Jan Deckers (2004), the division of the notion of anthropocentrism into strong and weak could be a solution. Strong anthropocentrism is defined as the doctrine emphasising the differences and discontinuities between human and nonhuman beings in order to justify human exploitation of nonhuman beings (Deckers, 2004; Light, 2000; Notron, 1984). Strong anthropocentrism is taken as the crux of the environmental predicament. Weak anthropocentrism, admitting the role of human beings without necessarily vindicating the intrinsic value of nature, might thus provide improvement.

These authors argue for weak anthropocentrism, however, their conceptions of this weak anthropocentrism are not equivalent. Among these authors, Norton's weak anthropocentrism rules out belief in the intrinsic value of nature. Norton (1984, p. 135) defines strong anthropocentrism as taking "unquestioned felt preferences of human individuals as determining value" while weak anthropocentrism as the theory of value incorporating human felt preferences and desires as well as rational and critical ideals such as living in harmony with nature rather than valuing nature intrinsically. From his perspective, the assertion of the intrinsic value of nature runs the risk of "questionable ontological commitment" (Norton, 1984, p. 138).

As for Light, he divides anthropocentrism into strong, weak and non-. The most crucial point of the weak anthropocentrism consists in the notion that human beings have moral obligations to future generations to leave them a healthy environment;

while non-anthropocentrism is distinguished by the point that there is intrinsic value in all "natural" beings but not in "non-natural" objects or man-made objects (Light, 2000, p. 69). We may find that Light's weak anthropocentrism assumes human intrinsic value while his non-anthropocentrism[38] is grounded on a distinction of humans and nature which assumes an essential difference between human and nonhuman beings. Both the idea of human intrinsic value and the essential human/nonhuman distinction still fall into the trap of the essentialism of taking humanity or nature as a certain, fixed and static entity.

According to Deckers, weak anthropocentrism "attaches greater moral significance to the intrinsic values that exist within the nonhuman world, and leads to a number of practical behavioural rules…which would not be embraced by strong anthropocentrism" (Deckers, 2004, p. 360). Deckers points out that this weak anthropocentric ethics can be understood as weak egalitarian speciesism. The basic doctrine of this weak anthropocentric ethics or weak egalitarian speciesism can be summarised into the following two points. First of all, speciesism, meaning favouring members of our own species, is a natural inclination and therefore is moral. Interspecific discrimination (discrimination among different species) is allowed. Intraspecific discrimination (discrimination between members of the same species) is not allowed; this is egalitarianism --- since all human beings are members of the same species, they are not allowed to be discriminated against. Secondly, nonhuman living beings have intrinsic value because they have similar goals to human beings, including survival, flourishing, or having experiences. Nonliving beings have their intrinsic value since "they realise themselves in ways that are not entirely determined by external forces" (Deckers, 2004, pp. 359-387).

We may find from the above that Deckers' view justifies the intrinsic value of nonhuman living beings by means of anthropomorphism and that of nonliving beings by means of teleology. In comparison with Light's view, his view tends to advocate continuity between human and nonhuman beings, which is consistent with the perspectives of philosophy of becoming and the evolutionary view of nature. However, Deckers' explanation of weak anthropocentrism does not convincingly

[38] In the terms of Nash (1984) and Weston (1996), the non-anthropocentrism in Light's mind could be called "biocentrism" or "sentientism", admitting that all sentient living beings but not nonliving beings have intrinsic value.

overcome the shortcomings of the strong anthropocentrism defined by himself and cannot sufficiently lead to the attachment of greater moral significance to the nonhuman world. According to his definition, strong anthropocentrism is described as the doctrine emphasising the differences and discontinuities between human and nonhuman beings in order to justify human exploitation of nonhuman beings. If we make a comparison between these two versions of anthropocentrism we hardly find from the weak anthropocentrism how to "repair" the differences or discontinuities between human and nonhuman beings implied by the strong view; on the contrary, Deckers' weak anthropocentrism is nearer to strong anthropocentrism than he acknowledges because, basically, Deckers asserts the discontinuity between humans and nonhumans and takes human intrinsic value as the ultimate criterion, which can be seen as the legacy of strong anthropocentrism or Enlightenment humanism.[39]

Overall, although the authors above do not provide a sufficient and coherent explanation of weak anthropocentrism, their distinction of anthropocentrism into strong and weak helps to 1) pin down the theoretical crux of the human/nature relationship and 2) reveal that human beings are the inevitable but not the monopolised participants during the process of perceiving nature. Viewed in this light, strong anthropocentrism can thus be understood as the notion that takes human beings as the "centre" of the world, and the idea of the discontinuity and differences between human and nonhuman beings which are often used to justify human supremacy and hubris and human mastery over nature and all nonhuman beings. Furthermore, nature

[39] There are two flaws in Deckers' argument, which can be divided into two aspects: relating to non-human living beings and non-living beings. On the aspect of non-human living beings, Deckers asserts that non-human living beings have intrinsic value due to their human-like behaviours. We may find that this assertion is grounded on the belief of intrinsic value of humanity. This belief is obviously the legacy of strong anthropocentrism or Enlightenment humanism and weakens the critical power of weak anthropocentrism. Following this, two points are in need of more clarification: first, animals have intrinsic values because they behave like human beings. This point seems to suggest that human behaviours can be used to prove human intrinsic value. But why? Because they are rational? On one hand, if human intrinsic value is justified by rational behaviours and the underpinning rationality or mind, can animals' human-like behaviours be taken as a proof that they are rational beings and then to manifest the intrinsic value of animals? Obviously this is a self-contradictory view. On the other hand, if human behaviours are irrelevant to their intrinsic value, there is no point in using the analogy between human behaviours and animals' human-like behaviours to legitimise the intrinsic value of animals. As for nonliving beings, according to Deckers, their intrinsic value is shown in their realisation in ways "that are not entirely determined by external forces" (2004, p. 379). Deckers seems to suggest that nonliving beings realise themselves in accordance with natural laws which are not determined by human beings. However, the concept of law is as arguable as that of intrinsic value.

in the perspective of strong anthropocentrism is a resource at human disposal and command.

In order to solve the problems caused by strong anthropocentrism, some critics of anthropocentrism attempt to eradicate the differences by the assertion of the intrinsic value of nature (as well as humans); however, this orientation is to mistake the subjective conception as the objective idea and is possibly to lead to the danger of objectifying and reifying the ideas of value, nature and humanity. Acknowledging that nature has no intrinsic value does not necessarily imply a sweeping victory of the strong anthropocentrism and its continuous arrogant dominion for future educational ideas and practices about nature. Some other authors attempt to solve the problems by revealing the anthropocentric over-emphasis on, and over-estimation of humanity; "humanity" is thus taken as the target that needs to be examined, interrogated, fixed, or even eradicated. However, the objectification and reification of the idea of nature faces the same critique: "humanity" in the strong anthropocentric sense as well as "nature" in the ecocentric sense are effectively taken as essences which are immutable and fixed properties. The issue of humanism (as in relation to essentialism) has already aroused innumerable discussions; various modes of thinking such as postmodernism, anti-anthropocentrism, anti-humanism, inhuman, posthumanism, non-anthropocentrism, plural humanism and, eco-pluralism attempt to overcome human hubris by various means of dealing with the idea of human subjectivity or humanity, such as correction, amendment, reconceptualisation, erasure, or deconstruction (Badmington, 2003; Braun, 2004; Curry, 2003, 2007; Derrida, 1969; Stables & Scott, 2001; Weston, 1991). These postmodern positions can provide inspiration for the development of the kind of weak anthropocentrism that this thesis is pursuing. It is a perspective acknowledging interaction and intertwinement between humans and nature without taking human beings as the only one centre nor eradicating human beings as understanding agents. Weak anthropocentrism gives us the inspiration that nature without any intrinsic value can still be taken as the source of meaning and at the same time, human beings can be meaning-conceiving without being the only carriers of meaning. The concept of nature without intrinsic value does not denote a fictional nature; likely, the understanding of the human/nature

relationship without human-centeredness does not imply the negation of human subjectivity.

Following the discussions of the previous chapters and drawing on postmodern ideas and weak anthropocentrism, I propose a notion of anthropo-non-centrism as an orientation of recognising the epistemological primacy of human beings and deconstructing the perspective of taking human beings as the centre of the world. In my view, anthropo-non-centrism holds potential for leading our understanding of the continuity between human and nonhuman beings and for the deconstruction of human-centredness.

6.2 Anthropo-non-centrism and Nature

What is anthropo-non-centrism? What inspirations could it bring to our education to improve the flaw of meaning-poverty caused by strong anthropocentrism?

In my view, anthropo-non-centrism is a vantage point which acknowledges every human being as a starting point of weaving one's own lifeworld but without taking the collective human beings as the ultimate and exclusive centre of significance in the world. This view is conceived on the ground of philosophy of becoming, the view of nature with non-divine *telos* and the enchanted view. From this view, the understanding of the relationship between humans and nature could be more open and inclusive; the boundary between humans and nature is reconsidered; more flexibility, possibilities and meanings might be brought in the understanding of the human/nature relationship. Overall, anthropo-non-centrism could point towards new and fresh meanings for our education.

In order to justify this position, it is necessary to explicate how it is possible for us to understand nature without taking ourselves as the ultimate convergent centre, without monopolising human beings as the exclusive source of meanings, since, as human beings, it seems impossible for us to conceive nature from a perspective other

than our own. What may be helpful for us to make this exploration is to think how the divides between humans and nonhuman nature, centre and margin, and "what human beings are" and "what they are not" have been formed. The histories of both humanity and humanism are mainly a history of humanisation --- defining what humanity is by the exclusion of what humanity is not. The history of education in this sense can be understood as a history of educating about the inclusion of what humanity is and the exclusion of what humanity is not. Therefore, the history of education can be understood as a record of exclusion and inclusion inevitably. On this view, animals and machines are two very conspicuous representatives to be ruled out of the human world through history. The exploration of animal and machine can shed light on the process of establishing anthropocentrism and the implied problems: How do people learn about animals? How do people learn and teach about machines? What kinds of conception of animal and machine are implied during the process of learning?

It is undeniable that animals have always played an important part in stories, fables, legends, myths and folklores in all cultures. These stories can be the sources from which people learn about animals. Yet the huge number of the stories about animals does not necessarily imply the same huge amount of meanings of animals. Interestingly, the roles of animals in these stories are often depicted either in a humanised way or as unintelligible monsters and ogres. The aim of the stories may be to teach about the social and ethical codes but not the knowledge of animals themselves. As Derrida (2002) states, "We know the history of fabulation and how it remains an anthropomorphic taming, a moralising subjection, a domestication. Always a discourse of man, on man, indeed on the animality of man, but for and as man" (2002, p. 405). If animals themselves are taken as the object to be learned, it has been a tendency for animals to be taken as manipulatable and deployable resources for human exploitation.

Animal experimentation and vivisection have been conducted since ancient times. For example, Galen of Pergamon, the physician of Marcus Aurelius, used vivisection to make studies of the functions of respiration and heart action. He stressed an indifferent and pitiless attitude towards animals when conducting vivisection (Maehle & Tröhler, 1987). The attitude towards animals is the disenchanted attitude as discussed above. This kind of attitude is prevalent through

many intellectual discourses in history. Aristotle, as mentioned, could be regarded as an important initiator of biological science. In his related works such as *History of Animals*, Aristotle gave detailed accounts of various functions of various body parts of animals. The tone he describes is objective, neutral and scientific. For instance, he divided blooded animals into four categories: oviparous and legless, oviparous and biped or quadruped, internally viviparous and legless, and internally viviparous and biped or quadruped (Cosan, 1998). The most important point is that the categorisation is grounded on dissection, vivisection and anatomical thinking (Cosan, 1998). The assumption is that animals are objects, not one of us --- human beings. Therefore human vivisection is unacceptable and a violation, as Boyle states, "not only of divinity but humanity" (cited in Maehle & Tröhler, 1987, p. 20). The notion of divinity provides legitimacy for human supremacy as well as for human conducting animal experimentation, dissection and vivisection.

The biological and physiological similarities and commonalities between animal body and human body and structures disturb philosophers and scientists who have a belief in the Enlightenment humanism before the advent of evolutionary biology. The disturbance can be addressed as follows. Since human beings are God's chosen creatures among various living beings, why are there physiological and physical similarities between humans and animals? Thus we read the following idea from Descartes and Malebranche's works that, without any feelings, animals are beast-machines or automata. For Descartes, animals are beast-machines that cannot feel pain but only go through external motions which in humans are symptomatic of pain "without experiencing its mental sensation" (Maehle & Tröhler, 1987, p. 26). In order to maintain the discrimination between human beings and animals and sustained the objection of the biological and physiological similarities, anthropocentrists assert that animals are machines which are apparatuses, contrivances and instruments, whether their bodies and human bodies are alike or not.

"Animal" and "machine" are paradoxically combined as "beast-machine" --- in the term of Descartes: both are grouped into the same category of "nonhumans". And thus in some respects, they are amalgamated as "automaton". In general "animal", "machine" and "automaton", as nonhuman aliens or monsters, are taken as things with less importance and lower value; they are in the same group, the oppositional and

subjugated group in relation to human beings. The features of the most occult and the most distinct are amalgamated together and bring forth the concept of "automaton". As Derrida states, "Confined within this catch-all concept, within this vast encampment of the animal…as in a virgin forest, a zoo, a hunting or fishing ground, a paddock or an abattoir, a space of domestication, are all the living things that man does not recognise as his fellows, his neighbours, or his brothers" (2002, p. 402). What is more interesting is that a paradox is deeply implied in the history of exclusion of nonhuman beings, that is, human beings are defined themselves by defining the others or aliens.

From histories we usually learn that animals are objects that have been raised, farmed, hunted, captivated, domesticated, tamed, or trained by human beings. Animals are the objects to be deployed and exploited during these relationships; however, according to Derrida, it is because of animals that humans are humanised through practising these actions. These human actions exerted on animals such as farming, hunting, and domestication can be understood as "being after", "being alongside", "being near", "being with", etc (Derrida, 2002). These relationships between humans and animals are mutually interrelated and inter-revealing. In this respect, Derrida reveals the meaning implied in the human/animal relationship which has often been ignored: the concept of animal is invented by human beings and at the same time, human beings invent themselves by inventing animals (nonhuman beings). According to Derrida, the Greek mythology of Bellerophon and Chimaera sheds light on the relationship of humanity and animal: "He [Bellerophon] represents…the figure of the hunter. He follows. He is he who follows. He follows and persecutes the beast. He would say: I am (following), I pursue, I track, overcome, and tame the animal" (Derrida, 2002, p. 410). Moreover, there is a more implicit and deeper relationship between humanity and animal in this myth: in order to hunt and kill Chimaera, Bellerophon needs to tame Pegasus, archetypal horse, as well as his own half-brother. Thus this human pursuit of animal is indeed a pursuit of an "other" self. It is insightful for education: what and how educators teach about animals should be put under re-examination and reconsideration. Animals are taught about in a way that tends to emphasise the discontinuity and the opposition between human subjects and animal objects.

As mentioned, the stories of animals are actually the stories of humans, about the animality of human beings: “Always a discourse of man, on man, indeed on the animality of man, but for and as man” (Derrida, 2002, p. 405). Derrida reveals the human/nature divide as a conceptual construction embedded in culture, tradition and language. This process of identifying animal as “animal-machine” is a discriminative domestication exerted on animals by incorporating “animal” as the wild and the unintelligible into “machine” as the manageable and intelligible. This process is a discrimination operated by one species --- *Homo sapiens* --- on all the other species that are taken not qualified as *Homo sapiens* and thereby are taken as an other “whole” --- the Animal. Therefore he uses a neologism “animot” combining the terms of “animal” (animal/animaux) and “word” (mot) to represent “the Animal” (Braun, 2004; Derrida, 2002). Since this process of discrimination has been deeply implanted and embedded in culture and language, it becomes a repeated and almost automatic operation of separating nonhumans from humans; in the terms of Italian Philosopher Giorgio Agamben (2002), this process is an operation of the “anthropological machine” including two kinds of manufacturing acts: humanisation and animalisation. In my view, this machine aims at manufacturing two main kinds of qualified products: human beings and nonhuman beings, the civilised and the wild, the educable and the uneducable. As Agamben states, this “anthropological machine”

> *…is at work in our culture. Insofar as the production of man through the opposition man/animal, human/inhuman, is at stake here, the machine necessarily functions by means of an exclusion (which is also already a capturing) and an inclusion (which is also always already an exclusion). (Agamben, 2002, p. 37)*

Overall, what inspirations can Derrida’s “animot” and Agamben’s “anthropological machine” arouse for education?

In the views of Derrida and Agamben, the human/nature or human/animal relationship can be understood from a viewpoint that goes beyond the accepted and habitual tradition. The understanding of “animots” and “anthropological machine” helps us to envisage a position, a vantage point or a perspective which embraces

different views of human beings and non-human beings, which can be referred to as anthropo-non-centrism. Human beings and nonhuman beings are inseparable and continuous in this light; human beings cannot be humans without animals. Anthropo-non-centrism illuminates how the accepted thoughts are deeply influenced by anthropocentrism: we, human beings, invent ourselves in the sense of inventing nonhuman beings in order to construct human beings as the masters of nature. We set forth the meanings of humanity by means of expelling the nonhuman beings from our territory; actually, we expel and impoverish ourselves. Therefore, human beings indeed are not the centre of this world, though we always (mis)take ourselves as such. Thus we may infer that the concepts of human beings and animals exist on a continuum; there is no distinct borderline in between. In this sense, the understandings of human beings and of animal are continuous.

Some thoughts related to education can be made explicit.

First of all, the anthropocentric distinction between human beings and animals is a discrimination against both groups. What is in common for both groups is that they need to undergo the normalised treatment from the anthropological or cultural machine to be "qualified products". We are thus invited to ponder the following questions: Are humans treated in the way that animals are treated? Is there any action that is assumed to be "proper" for exerting on animals exerted on humans? If so, is it acceptable or allowable? For example, we always take it for granted to tame or train animals; can we take it as proper to tame or train pupils? Can the process of learning be understood as a process of receiving discipline or training or machining? What does it mean by "a 'humane' treatment of 'animals'"? Certainly, the process of edification, civilisation or normalisation is, in some respects, the process of normalisation, standardisation and specification. The end of standardisation, whether be it performed in school or in factory, is to produce qualified and accredited outcomes, e.g. students with completion of GCSE or IGCSE exams. If we are not comfortable about the thought that takes humans as machines, why do we accept schooling as a process of civilising and edifying when this process is actually practising the normalisation, credentialisation and standardisation of people? Why do human beings subjugate themselves to the "anthropological machine", whether it be in the names of tradition, culture, custom, schooling or any institution? Why do

people yield themselves to the institution-machine to be rated, ranked, marked, classified and trained, tamed, labelled and allocated? Why do people obey the machining which leads to a uniform view and life with poor meaning? If education should aim to lead people to learn and to live a more meaningful life, what should be done to the present machinised schooling and curriculum?

In some respects, these enquiries in relation to animals shed light on the inextricable and paradoxical relationship between humans and nonhumans. We have found that, on the one hand, the concepts of humans and animals are interdependent and interweaved; there is a mutual reliance; on the other hand, it seems unbearable for us to imagine that humans and animals are treated in the same way, especially in education. It is unbearable if pupils are treated in the way that animals are usually dealt with. The sense of "unbearableness" invites us to reconsider in-depth how we differentiate ourselves from animals, how the boundary between humans and animals is drawn, how the boundary is fixed and reified and how the boundary exerts oppression. The traditional anthropocentric view has already provided a lot of arguments for discrimination against animals in theory and practice; these arguments have been challenged and discredited. What needs notice is that the interrelationship of humans and nonhumans is beneficial for problematising the taken-for-granted things.

We used to treat humans and nonhumans in certain ways and attitudes. If we are not very sensitive and critical to reflect and examine what we are used to, the sense of "unbearableness" will not emerge when customary ways are practised. Only when the customary ways of treating objects are changed, our sense of unfamiliarity appears and the implied discrimination towards beings has been unearthed. Thus the sense of "unbearableness" is educationally important because it problematises the ways that we used to treat particular beings (including humans and animals) in particular ways. Further questions arise: From the conventional perspective, is there any specific and particular way of treating humans that cannot be exerted on animals, and vice versa? Whether the answer is positive or negative, what is the reason? The considerations led by the above questions are crucial for preventing the educational predicament of meaning-impoverishment by the customary or habitual way of teaching. This point is in tune with the previous discussion about the philosophy of becoming: the "reality"

of nature is that there is no fixed reality in and of nature; everything is becoming. Meaning is constructed and perceived within these dynamic interactions and thereby keeps relational and differing. Therefore, it can be suggested that all the ideas and practices are questioned and examined continuously because nothing should be taken for granted or accepted as it is. If the habitual ways of thinking and practice are not questioned, their meanings might be fixed and restricted and could result to the poverty of meaning, which is the crisis of education based on anthropocentric view.

The operation of the anthropological machine implies a social-political discrimination. It was originally a process of drawing the distinction between humans and nonhumans, revealed by Derrida and Agamben, a process of "machinisation" to manufacture or produce non/humans. This machine machinises all beings to distinguish nonhumans from humans; the "nonhumans" can include animals and "unqualified" humans. For example, "the slaves, the barbarian, and the foreigner, as figures of an animal in human form" should be excluded (Agamben, 2002, p. 37). In his view, humans are thus animalised; in other words, unqualified humans are (taken as) animals. Every individual being is like a part which is moulded, shaped and welded by the huge machine. It is omnipotent but intangible, omnipresent but invisible. It is deeply embedded and interweaved in culture, tradition and language. No human being can be fully extricated from the fabrication of the established. Viewed in this light, the anthropological machine is an all-embracing and all-inclusive hegemony.

The anthropological machine is thus a means for exerting bio-power (to distinguish between nonhumans and humans) and socio-political power (to distinguish nonhumans in human forms from humans). As a vast and collective achievement, it seems difficult to be escaped from for all beings. Processed by the anthropological machine, humans and nonhumans are specified and regulated in a particular way. The definition, specification and regulation are outcomes of human civilisations, customs, cultures, languages and traditions which are crystallisations of human common and collective experience. In other words, traditions, cultures, languages and customs are the ideas and practices that have been implemented by a group or groups of people for a period of time. Viewed in this light, the performance of the anthropological machine is a process of exerting the establishing meaning

through collective construction. The meanings of non/humans are constituted through the operation of the vast collective machine which handles, arranges, organises and structures the collective human experience. The above brings some deeper thoughts concerning education to us: whether the collective experience should be taken as a model for every individual to follow? If so, where does individual difference and creativity emerge and be conserved? In addition, if the collective perspective is taken as the only perspective for understanding and learning about the world, nature, humans and nonhumans, we return back on the path of strong anthropocentrism whose undesirability has already been argued. Therefore the critiques above lead us to question and problematise anthropocentrism.

However, I do not mean to reject the collective experience, which, as a part of culture, language and tradition, is also an inseparable part of every individual meaning-construction process. The collective experience which is defined by this thesis as "anonymity", will be elaborated in the next chapter. As long as humans learn and understand, they interact with collective experience. What I mean to emphasise is that individuality and individual difference should be greatly heeded and taken as primary. Yet in the mainstream anthropocentric view, learning about collective experience is taken for granted whereas individual difference is lessened and suppressed. Actually, regarding learning, individual difference matters much more than collective experience because every significant moment and experience is individual and different from the others. Individuals cannot be moulded or shaped into similar and alike people. Individuals must and should be individuals who are different from each other even take the same process of machining-schooling.

Thus we still could find an exit or a fissure of the anthropological machine for individuals to flee away. According to Agamben, there is a so-called "bare life" which "is neither an animal life nor a human life", but a zone "within which…the articulation between human and animal, man and nonman, speaking being and living being, must take place" (Agamben, 2002, p. 38). In my understanding, this bare life denotes the fissure which provides the intermediate and intertwining zone of humanity and animality. This fissure, in my view, lies in every individual embodied experience. It is the primordial and embodied experience of the individual living being. It is an occasion for individual freedom and difference to emerge and exercise. The individual

embodied experience provides us a possibility to learn that every one is different from any other and anyone holds potential for providing difference. This point will be more fully argued in the following chapter.

This is a starting point for constructing our anthropo-non-centrism: the multiple and heterogeneous individual views are the ground for understanding all beings in nature. On this view, every being provides a perspective as a part of the view of nature; yet no one perspective can and should override the others'. Even in our own internal field of understanding, we always conceive meaning from the process of interacting with the others including human and nonhuman beings. In contrast, anthropocentrism supposes that there is "one" perspective which can present and represent the view of the whole of humanity. Its implied danger of impoverishing meaning of life and education has been revealed and thereby needs improvement. The discussion of Derrida's and Agamben's critiques of strong anthropocentrism strengthens the argument for anthropo-non-centrism and, interestingly, gives the hint of the significance of personal embodied experience, which will be pursued in the next chapter.

6.3 Summary

In closing, the grounds for anthropo-non-centrism and the related critiques of anthropocentrism can be summarised as follows:

1) The meaning of "human" is intertwined with that of "nonhuman" or "nature"; the understanding of "human" is constructed on the ground of drawing the distinction between humans and nonhumans.
2) Human or anthropo- understanding is always an understanding occurring in changing relations including "being-with", "being-along", "being after", "being near", etc. Human understanding is always relational and cannot be monopolised by one centre.

3) Nature in this anthropo-non-centric view denotes a conceptual source which inspires differences, e.g., different understanding, different interpretation, and different meaning.
4) The discrimination against "nonhuman" (including "animal" and "machine") exerted by the anthropological machine is at the same time, implicitly or explicitly, exerted against human beings.
5) The process of meaning-construction incorporates the collective and individual aspects while the latter is often ignored.
6) The individual aspect of the process of meaning-construction, as the zone where individual difference lies, holds the potential for evoking more and richer meanings and thereby offers an escape from the restriction of the anthropological machine and anthropocentrism. This point may lead to the investigation in the next chapter, aiming at exploring the ways of experiencing nature and revealing the most educationally desirable one.

In close we may conclude from the above exploration that, as members of *Homo sapiens*, we cannot deny that our understanding must be grounded on a "human" perspective. But this "human perspective" or "anthropological perspective" is always intertwined with the understanding of nonhuman beings. Moreover, this "human" should not be interpreted as a whole species because the ways of understanding the world of every human being are always different to some degree. This "human perspective" is not a pure, single and central view. Thus I propose anthropo-non-centrism as a perspective, acknowledging the others as participants in the process of meaning-construction for every particular individual. On this view, nature incorporating humans and nonhumans can be conceptualised as a source which inspires inexhaustible and unpredictable understanding, interpretation and meaning. This anthropo-non-centrism holds more potential for bringing more and richer meaning to education and life and therefore is more desirable than anthropocentrism.

7

Disengaged or Engaged?

Following the previous discussions of meaning of nature and the educational implications, two kinds of approach to learning are adumbrated: disengaged and engaged. This chapter will argue that the disengaged approach to learning of nature can be inferred from the philosophy of being/substance, the view of nature with divine *telos*, the disenchanted view and anthropocentrism, and the engaged approach from the philosophy of becoming, the view of nature with non-divine evolutionary *telos*, the enchanted view and anthropo-non-centrism. The disengaged approach to learning about nature may not escape from the educational predicament caused by the philosophy of being, the view of nature with divine *telos*, the disenchanted view and anthropocentrism; furthermore, it could undergird the predicament by accentuating collective and disembodied experience. In contrast, the engaged approach will be revealed as the more desirable process of learning since it can lead to a more authentic and meaningful learning and living than the disengaged view by emphasising individual and dynamic embodied subjectivity.

The discussion in the previous chapter has shown that any moment of learning and living in experience is always an interaction between body-subjects who are situated in established contexts. The conceptions or knowledge that one body-subject learns are, to a great extent, contextualised in customs, conventions, traditions and languages and thereby can be understood as part of the majority or collective practice. There is one important feature implied in collective practice: anonymity. The

collectively accepted practices are implemented in and by the collective public who are not known in person; in Heidegger's (1962) term, the collective public or the collective subject are the anonymous "they". This is what I call "collectivism", a view of dismissing individual difference and taking every person as an equivalent member of a certain group. In this sense, everyone is "equal" and without difference; everyone is the same and nameless "One". The most important point is that the anonymous one/they is all as well as one; meanwhile, the anonymous they are not responsible since they do not and cannot engage themselves with anything. Drawing on Husserl and Merleau-Ponty, engagement is defined in this thesis as a responsible action practised in person, authentically in her own name and no-one else's. Only a lived individual, a personal, intending agent can be a responsible subject.

What is educationally noticeable here is that every process of learning is unique; it does not take place in a nameless or a collective subject. The learning process is unique: it can bring particular interpretation and meaning from the unique individual during the process of incorporating individual and collective experiences. The collective experience denotes the experience that is accepted by the majority or collective public, or anonymous they. The process of learning can be understood as incorporating the part of acquiring collectively-accepted commonsense via shared language and the part of inciting particular individual meaning. It will be argued that the disengaged approach to learning, which is also the mainstream view of learning, pays much heed to the common knowledge but rarely attends to the individually different meanings. In my view, for educators, what needs to be valued is the particularity and difference that is the source of creativity, innovation and novelty. To pay attention to this part of the process of learning will be called the engaged approach.

Overall, my general concern about education can be addressed as follows: the mainstream discourses of learning pay unbalanced and excessive heed to commonly-accepted, commensurable and established human experience. They tend to take the disengaged approach to learning for granted. It will be argued that this view ignores individual difference and results in the disembodiment of our curriculum. This limited view of experience is what this thesis calls the "disengaged" view. This approach could cause the problem of meaning-impoverishment because it loses the balance

between common and individual experiences. An approach to learning should be rooted in personal lived experience, viz. lifeworld. This approach, in contrast with the disengaged view, is the "engaged" view, stressing the incommensurability, embodiment, uniqueness, dynamics and particularity of every experiencing individual--- i.e., the embodied authorship.

The above thoughts lead us to the final theme regarding nature: that of nature as engaged and disengaged. It will be argued that the disengaged construction is more collectively embedded, viz., culturally or socially dependent, while the engaged construction puts more stress on the personal and idiosyncratic aspect. It will be demonstrated that the disengaged approach to nature could aggravate the educational predicament caused by the philosophy of being, the view of nature with divine *telos*, the disenchanted view and excessive anthropocentrism; whereas the engaged approach, consonant with the philosophy of becoming, the view of nature with non-divine *telos*, the enchanted view and anthropo-non-centrism, may provide improvement for the problem. Furthermore, the difference between the engaged and disengaged approaches to the meaning-construction of nature will be made explicit by the discussions of nature as another pair of polarities: space and place.

At last, we might return to the interrogation of nature with respect to the aspect of engagement and disengagement: What kind of process of meaning-construction between human beings and nature is educationally meaningful? How might human beings dwell, act and create in their surroundings in an educationally meaningful way? After the exploration in relation to the polarised ideas of engagement and disengagement, I will attempt to show that the engaged learning process of the concept of nature can bring richer and more meaning to education and curriculum than the disengaged view.

7.1 Disengaged Learning and Collectivism as Disembodied Anonymity

This section aims to clarify the meaning of the disengaged approach and to reveal how this approach influences educational ideas and practices about nature. It will be demonstrated that this approach stresses disembodied experience with regard to individuals as well as collectivity. Any one of any group is understood as an anonymous being in this view. In my understanding, disembodiment and anonymity, as characteristics of disengagement, could not be compatible with an engaged approach to learning. Yet these two characteristics are often ignored. We may find that many educational discourses related to the concept of engagement claim themselves to be engaged approaches to learning but they actually imply the key characteristics of disembodiment and anonymity; thus, they are self-refuting in some sense. The following discussion will point out that the mainstream view of the engaged approach to learning is indeed symptomatic of the disengaged approach by revealing the implied features of disembodiment and anonymity. This exploration can bring us to reconceive engaged learning as embracing embodied lived experience and unique individuality.

A lot of studies focusing on school or student engagement have been done (Finn & Voelkl, 1993; Fredricks, Blumenfeld & Paris, 2004; Mann, 2001; McMahon & Portelli, 2004). As McMahon and Portelli (2004) point out, most studies of school or student engagement hardly discuss the philosophical meaning of the polarised concepts of disengagement and engagement, and consequently these concepts become popular, even empty and superficial catch-phrases or slogans. Thus it is necessary to conduct a philosophical investigation of the concepts of disengagement and engagement. This philosophical enquiry of the polarities will make explicit the distinguishing features between the dis/engaged approach of learning of this thesis from the others and help us to consider their contribution for learning about nature.

In general, the disengaged approach to learning has encountered many criticisms. Although there may be various interpretations of this approach, some traits are specified by authors as alienation, passivity, detachment, estrangement, lack of commitment and identification (Finn & Voelkl, 1993; Fredricks, Blumenfeld & Paris, 2004; Mann, 2001; McMahon & Portelli, 2004). Let us take a deeper look. For example, McMahon and Portelli (2004) criticise the current discourse related to student engagement as insufficient engagement (or disengagement) and propose an

alternative approach. According to McMahon and Portelli (2004), the current view can be divided into two types: the conservative/traditional and the liberal/student oriented conceptions. Within the framework of the conservative or traditional conception, learning happens by means of "abstract conceptualisations of engagement that are meant to apply to all settings irrespective of differences in contexts and needs" (McMahon & Portelli, 2004, p.62). McMahon and Portelli criticise that this teaching approach ignores the role of active engagement played by students during the process of learning and puts too much attention on the responsibility of teacher. This conservative conception emphasises the relationship between student engagement and academic achievement and thus can easily be taken as an instrument for teachers. As Finn and Voelkl state, "we view engagement as a sufficiently important construct to be considered as an outcome in its own right…it may be possible to manipulate student engagement to avert some of the negative consequences that are seen when students withdraw from class and school participation" (1993, p. 250). McMahon and Portelli (2004) point out that this view of student engagement can very easily become a form of indoctrination and an indicator of pupils' endeavours for learning the normalised goals and values approved by society. Learners are taken as passive receivers who are losing their active ability to criticise. This learning is a learning of, in Whitehead's terms, "inert ideas", which is to learn "ideas that are merely received into the mind without being ultilised, or tested, or thrown into fresh combinations" (Whitehead, 1962, pp. 1-2).

All in all, the above discussions expose deficits such as mechanism, abstraction, standardisation and determinism in this approach to learning but fail to identify the cruxes of anonymity, collectivism, impersonalisation and disembodiment.

From the critiques of McMahon and Portelli, three features of learning in this conservative perspective or disengaged approach, can be detected: learning as linear process, learning as instrument and learning as academic-achievement-driven (--- or in tune with the discussions in Chapter 4 --- "Science"-driven). From my anthropo-non-centric view, this conception of learning is "machining" aiming to manufacture one particular kind of product --- students with "success" in particular exams or degrees. Students who have been "adulterated" to become like adults who educate them or "mind" them (give them their "minds").

The liberal or student-oriented conception of engagement, drawing in the ideas of Cothran and Ennis (2000), Finn and Voelkl (1993) and Smith, Butler-Kisber, LaRocque, Portelli, Shields, Sparkes and Vibert (1998), broadens the meaning of engagement and improves on the insufficiencies of the conservative approach, but it makes the same metaphysical assumption as the conservative/traditional view: the philosophy of being, atomism, mechanism, determinism, rationalism, and anthropocentrism. This liberal engagement highlights the influence of the roles of community and teachers in student learning and the importance of students' voice but, for McMahon and Portelli, two major problems are still unsolved: there is no questioning of the purpose of education and there is an overemphasis on the procedural aspects of the treatment of engagement (McMahon & Portelli, 2004, p. 69).

Due to deficiencies of the mainstream conservative approach to learning, McMahon and Portelli propose a critical-democratic perspective on engagement. This approach is described as a process of interrelation between teachers and students including the "matter of techniques, strategies and behaviours" and the "[intrinsic] purpose of democratic transformation" (McMahon & Portelli, 2004, p.70). I agree with McMahon and Portelli on the point that engagement is a dynamic process; yet their view of engagement still suffers from some problems.

First of all, in the view of McMahon and Portelli, an engaged approach to learning is a process driven by an intrinsic purpose of social transformation. There are two flaws implied in this view: learning is still taken as a means of democracy and an instrument towards a predetermined goal. On this point, there is not much difference between the critical-democratic perspective of engagement and the former two views that they attack. Therefore, their view on this point is not consistent. The second related flaw is that the learning process is steered by a predetermined goal. In this view, the process of learning becomes the implementation of a series of arranged steps and thereby is a mechanical and inflexible procedure.

Furthermore, this view of engagement suffers from disembodiment and collective anonymity. As McMahon and Portelli state, critical-democratic engagement is generated "in a shared space, for the purpose of democratic reconstruction, through which personal transformation takes place" (McMahon and Portelli, 2004, p. 70). Following this, the personal transformation of the individual takes place for the sake

of social need. To admit the fact that personal transformation takes place in the process of interaction of individual and collectivity is one thing; to claim that the purpose of personal transformation is social construction or reconstruction is another. Education in this view is an instrument of society, to build every individual as a member or a part fitting into the normalised social whole. McMahon and Portelli's engaged learning focuses on enhancing the interconnection and interrelation between students, educators and schools rather than individual self-exploration and self-understanding. This approach tends to take learning experience as anonymous, inauthentic and disembodied.

This feature of anonymity in learning approach cannot be detected only from McMahon and Portelli's view, but from many authors' views. For example, Michael Oakeshott (1971), in a paper discussing the idea of school, argues that education is the transaction between generations in which new-comers are initiated into this world to become human, and learning as engagement must take place in a particular site --- school. He seems to suggest that, first of all, education is a process of humanising to turn potential humans into actualised humans. This view seems to assume the idea of an "essence" of humanity. There could be a risk in the Oakeshottian view of taking engagement in school as a means of shaping pupils into a particular species of being according to "the" human essence. The process of humanisation, as discussed in Chapter 6, could be understood as the operation of the anthropological machine, in Agamben's terms, which humanises humans while inhumanising nonhumans at the same time. Hence the Oakeshottian humanism might lead a discrimination and exclusion in order to educate young people to become more fully "human" beings.

Secondly, learning is taken as effort-taking work so that it needs learners to be engaged. Engagement is thus understood as a commitment of learners to give in school "where playful occupations are broken off whenever they cease to provide immediate satisfactions" (Oakeshott, 1971, p. 48). Oakeshott seems to interpret "engagement" as a particular ethical action occurring in a particular place --- school. Fredricks, Blumenfeld and Paris (2004) define learning engagement, in tune with Oakeshott, as students' identification with school and participation in school-related activities. However, this view seems to suggest that schools are the only place for learning and thereby are separated from the other places in life. What concerns me is

that this view takes learning activity as an activity exclusively taking place in school as well as secluding learning from living. Indeed, this "securing" of learning (making it "safe") as a peculiar activity merely suitable for school might fix and inactivate the learning process to some extent. The concept of engagement in major learning discourses is restrictively understood as a process of how the established ideas and institutions, or in Oakeshott's term (1971, p. 48), the intellectual, imaginative, moral and emotional inheritance, are initiated and tranferred to pupils; how the individuals submit themselves to the collective memory and experience in a particular setting only.

In relation to the previous discussion, this restrictive perspective on engaged learning or, in a more appropriate term, disengaged learning can indeed be seen as the domestication of the anthropological machine. The inauthentic approach to engagement encapsulates the previous philosophical positions rejected by this thesis: the philosophy of being, the predetermined teleological view, the disenchanted view and the collective anthropocentrism. The above discussion has argued that the disengaged approach characterises collective, disembodied, impersonal and nonindividual experience, whereas the engaged approach is, in contrast, distinguished by embodied, personal, individual and private experience. We can find that the engaged approach in the present studies focusing on the collective and impersonal and nonindividual experience in my definition is more validly definable as a form of disengagement. It can be summarised as follows: the object of learning or curriculum is assumed as predictable, fixed, controllable and exploitable; the learning process is taken as consisting of scheduled, planned and rigid procedures; the learner is expected and taught to be rational, objective and emotionless. Learners oriented by this approach are taught to be distanced and alienated from the objects to be learned.

Overall, I do not deny that individual attachment to community, say, pupils' attachment to school, is important for learning. What I aim to make visible is that individual attachment to or identification with the group cannot be confused with individual engagement with one's own lived experience. What I argue against is to take the individual as an impersonal, anonymous and homogeneous, equivalent component of a group. What I reject is to take the individual compliance with collectivity as the primary end or driving force of learning. This is not the individual

"engagement" with the collectivity but rather the burying of the individual (and individual difference) in the group. What is a more important point is that an anonymous one cannot be responsible for him/herself. When one takes oneself as an anonymous part of collectivity, it can be the beginning of irresponsibility because one holding the anonymous view does not make decisions and act on one's own. This view can be addressed in Heidegger's terms to be a "non-committal just-surmising-with-some-else" (Heidegger, 1962, p. 218). Anonymity is different from identification or attachment. In the former situation, one loses one's own uniqueness and responsibility, whether it be intentionally or unintentionally, and speaks not in one's own voice.

Thus a truthfully and genuinely engaged learning should be a process which can be experienced only individually, personally, and immediately. No one can genuinely or completely experience any other's experience. One can make sense of the other's experience only (but importantly) by way of imagination, sympathy, empathy and interpretation; in more accurate terms, understanding of the other's experience is an attempt to make similar sense of the object that the other person experiences. All experiences are experiences of something; there is no experience as experience void of content. The content of experience, e.g. sensation, perception or understanding, is the meaning constructed by the interaction between the experiencing subject and the experienced object. People can approach the same object but their experiences of this object cannot be exactly same because the understanding of experiential content, the meaning is constructed internally in private, individual and personal ways. No matter how similar the meanings of different people's experiences have been understood and interpreted, there are always nuances. No two minds are identitcal. People may use the same symbol or sign or concept to describe a certain object in nature; however, the significance and meaning apprehended varies from person to person. A responsible agent should be an individual who can decide her own actions based on her own lived experience. Viewed in this light, learning as experience lived by every individual is a process which varies from person to person, but, fortunately, with sufficient shared overlaps to make communication and cooperation possible. Learning is a process exclusively practised in a person. Therefore, the individual heterogeneous lived experience should be taken as the ground for learning. The disengaged approach can

be characterised by adopting collective and anonymous experience as the perspective of understanding while the engaged approach locates meaning-construction and meaning-conceiving as grounded in personally heterogeneous experience. The genuine engaged approach to learning should be a learning process originating from an individual's particular immediate, direct, and pre-reflective lived experience, or in phenomenological terms, lifeworld (Lebenswelt).

7.2 Engaged Learning and Lifeworld as Embodied Authorship

The concept of lifeworld in the field of philosophy is acknowledged to be first highlighted by phenomenologist Edmund Husserl (Hung & Stables, 2008; Husserl, 1970; Leiss, 1972; Ströker, 1997; Van Koppen, 2000). Husserl's idea of lifeworld may be influenced by his contemporaries including Wilhelm Dilthey and Martin Heidegger and it has influence on others such as Maurice Merleau-Ponty and Alfred Schütz. The interpretations of this term are not totally consistent and unified. Even Husserl does not use this term in a very strict and consistent way. There may be different interpretations of the concept of lifeworld. For example, W. Dilthey (1985) describes lifeworld as follows: "A lived experience does not confront me as something perceived or represented; it is not given to me, but the reality of lived experience is there-for-me because I have a reflexive awareness of it, because I possess it immediately as belonging to me in some sense. Only in thought does it become objective" (1985, p. 223; cited in Van Manen, 1997). Although this description can be more fully explicated, Dilthey's description of lifeworld reveals its significance consisting in the characteristics of immediacy and pre-objectivity of experience and shows great potential for understanding the engaged approach to learning through lived experience (or lifeworld) as I will attempt to show.

Dreyfus and Todes (1962) take the lifeworld as an intermediation of the adjoining worlds --- prepersonal world and the objective and scientific world. As for Kullman and Taylor (1966), the term of lifeworld is used to denote the pre-objective

world but not the everyday experience and scientific world. According to Hung and Stables (2008), the idea of lifeworld can be understood from two orientations: lifeworld as a field of experience common for all and lifeworld as a personal and private world of immediate and lived experience. On this view, the idea of lifeworld includes disengaged and engaged approaches to experience. Most authors pay attention to the former orientation to take the lifeworld as an assemblage of collective experience rather than an individual field of personal experience. In contrast, Merleau-Ponty highlights the significance of the latter orientation: lifeworld as the realm of authentic, personal, individual, irreplaceable and, most importantly, embodied experience (Hung & Stables, 2008). Many authors agree that the Merleau-Pontian approach to the lifeworld could bring the best benefit for education because it marks out the significance of "body" or "body-subject" (Van Manen, 1997). It will be argued that the Merleau-Pontian idea of lifeworld and the implying intertwinement between lived experience and body-subject could deepen and broaden the meaning of engaged learning. Furthermore, the "body" (or body-subject) implies potency to counter the anonymity of the disengaged approach. The idea of body or body-subject is not only a pivot for understanding the concepts of engagement and lived experience (lifeworld). It also hinges on individual difference. The body presents the authorship of lived experience and therefore the individual uniqueness and particularity can be interwoven. It will be argued that the lived experience with authorship can point towards rich and fecund meanings for education. Next, let us explore the idea of lifeworld in chief by way of Husserl and Merleau-Ponty. Then we can go deeper into the educational implications.

First of all, for the purpose of this argument, the idea of lifeworld will be taken to denote "personal, subjective and embodied experience" (Hung & Stables, 2008). As a source of abundant and pre-analysed experience, lifeworld can be described as "the 'subjective-relative' *a priori*" (Husserl, 1970, p. 140). This subjective-relative or relational *a priori* is a ground for generating and constructing various meanings on different levels of understanding such as scientific and artistic cognition, emotion and attitudes. The lifeworld as personal, private and unique lived experience is the ground for constructing meaning and various kinds of knowledge such as scientific, humanities and artistic knowledge. Some may argue that scientific knowledge implies

universality and objectiveness. However, the "universal" or "objective" knowledge, on the ground of the discussion in the previous chapters, is constructed in a discursive space. The terms, "objectivity" and "universality" are used to denote the degree or extent of the acceptance, effect and performativity of the knowledge in focus. The claim that a certain kind of knowledge is objective and universal indeed denotes its relatively high degree of satisfactory acceptance, effect and performativity. It does not mean that this kind of knowledge is absolute, complete and perfect. Complete, objective, universal and perfect knowledge may be a dream of human beings but not a fact. A statement for which universality is claimed can never be verified. We would need to live for ever to collect all the evidence for it. Even Karl Popper, arch objectivist, insisted on that. It was his reason for adopting "falsifiability". If one claims that "All swans are white" then an observation of one black swan can falsify his/her claim.

Therefore "objective" knowledge can be understood as a construction of the "subjective-relative" lifeworld. Lifeworld, as obviously existing, "contains meaning- and validity-implications whose exposition leads again to new phenomena…" and "…everything objectively *a priori*, with its necessary reference back to a corresponding *a priori* of the lifeworld" (Husserl, 1970, p. 112, p. 140). Moreover, "this reference-back is one of a founding of validity… A certain idealising accomplishment is what brings about the higher-level meaning-formation and ontic validity… of every other objective a priori on the basis of the lifeworld *a priori*…" (Husserl, 1970, p. 112, p. 140). Merleau-Ponty elaborates this thought with the following description: "The whole universe of science is built upon the world as directly experienced, and if we want to subject science itself to rigorous scrutiny and arrive at a precise assessment of its meaning and scope, we must begin by reawakening the basic experience of the world of which science is the second-order expression" (2003/1962, p. viii/ix). Lifeworld is thus the primal and inchoate experience, the immediate objects of consciousness, the phenomena, the lived experience.

It can be found from the Merleau-Pontian perspective that personally and subjectively engaged experience is the fundamental base for bringing forth the collectively and commonly disengaged experience because the personal, individual

and primal experience is embryonic for various shared meanings to generate and develop. To further this point, it is personal experience on which the collective experience can be based, brought out and constituted; the personal, individual lived experience justifies the possibility of establishing collective experience. Therefore, the engagement with one's own personal experience is more fundamental and desirable for learning than the commitment to collectivity because it can bring forth more and rich meaning from every unique lifeworld. The meaning of learning consists in its vividness and embodiment taking place in every body of living flesh. Any experience of learning must be learned, apprehended, understood, interpreted and acted on on the personal level, then this experience has "means" for this subject. Then it is possible for this subject to learn it, to possess its meaning, to practise and to use it with others. This is the second-order learning on the level of collectivity.

The next significant insight to understand the concept of lifeworld is the idea of body or body-subject. Body, in my view, is the pivot of every unique lifeworld of lived experience; on this base, different individuals as particular living beings can work together to construct various and multiple common worlds. The construction, participation and sharing of the common worlds must be grounded on every unique individual experience because every engaged act can occur only in a living bodily individual rather than an anonymous, abstract and disembodied collectivity.

According to Husserl, the ego-subject is a living body of consciousness, perceptions, acts and kinaesthetic movements: "…participating in this [bodily aspect of things] is our living body, which is never absent from the perceptual field, and specifically its corresponding 'organs of perception' (eyes, hands, ears, etc.). …they function in seeing, hearing, etc., together with the ego's motility belonging to them, i.e., what is called kinesthesis" (Husserl, 1970, p.106). On this point of body-subject, Merleau-Ponty (1962, 1964a, 1964b, 1970, 1988, 2003/1962) elaborates and expands Husserl's idea and reveals an idea of a dynamic, experiencing body. This idea of body implies profound and fertile meanings for education. According to Merleau-Ponty, the body is a starting point for the individual to own one's world through embodied experience. Viewed in this light, the uniqueness of individual lifeworld is displayed by the embodied action of the subject. This characteristic of bodily lived experience can be called "authorship", highlighting that this subject, without fixed and closed

identity, open to changes, can be distinguished from the others. This point may be helpful to keep education away from the trap of disembodied anonymity.

Overall, the meaning of lifeworld and the body-subject and the related educational implications can be explicated along the following lines:

1) The lifeworld (consisting of lived and living experiences) is a process of becoming which is under the continuous and dialectical course of construction and deconstruction, taking part in, taking apart, and so on.
2) The lifeworld is the ground for generating understanding and meaning. The engaged approach can be helpful to evoke richer and more meanings than the disengaged one.
3) The body-subject lives and also authors its own unique life. The body-subject paradoxically incorporates concrete embodiment and incomplete, narrow-but-continuously-opening-expanding subjectivity without being taken as a soul- or mind-entity.

First of all, it has been revealed that the lifeworld is a realm of lived and bodily experience as well as a dialectically ever-renewed and ever-becoming process without imaginable limits. This process is in dialectical becoming: one's lived and living experience is always moving between construction and deconstruction, taking part in and taking apart, devouring and producing, filling and emptying, etc. During the flow of living experience, the body contains and constitutes the meanings of oneself and one's multiple worlds; however, self-awareness and the knowledge about the worlds are flexible, mutable and dynamic. This does not mean that all knowledge and existence are imaginary, fictitious or even illusionary but rather that the knowledge to be learned is experienced, sensed and learned in a particular way and thus other ways of making sense, interpretation and understanding should be welcome. This point is in tune with the philosophy of becoming.

Merleau-Ponty manifests the dynamic meaning of the body-subject through a particular approach to investigation: "pathological reduction" (Hung, 2008). By conducting the pathological reduction on the morbid motility of brain-injured patients and some psychological experiments, Merleau-Ponty reveals one very crucial meaning of "body" that has often been ignored: the body-subject is a participant,

engaging with the surroundings, with other body-subjects and with objects during the meaning-constructing-and-comprehending process. This body-subject is a becoming subject rather than a fixed or a monadic ego. The body can attend, adapt, respond, act and react to the surroundings and the others even after this body is recognised or diagnosed by "normal" people as "morbid". For example, a classic and well-known eight-day experiment which has been discussed by Merleau-Ponty (1962; 2003/1962) was conducted by G. M. Stratton on himself (1897a; 1897b; 1897c; 1899). Stratton wore glasses to change the retinal images into inverse vision. According to Stratton's (1897b) observation and report, the scene on the first day was "entirely upside down". On the last day Stratton found his body adapted into the state of harmonisation of the new experience especially when he acted actively such as walking or rocking the chair; while when he was in the passive state, e.g., sitting, the old or pre-experimental localisation of his body reappeared. After the end of the experimentation, Stratton took off the glasses; for hours he felt that the scene had a "strange familiarity" and "a surprising, bewildering air" (Stratton, 1897c).[40]

This case shows that the self or the body-subject is an inevitable participant in the processes of meaning-constructing but it is neither a stable and passive object nor an omnipotent master who can manipulate his/her own experience and manufacture meaning at his unlimited disposal. These processes are mutually intertwined (evolving

[40] The whole experiment can be briefly introduced as follows. This experiment was conducted by G. M. Stratton on himself in 1896 (1897a; 1897b; 1897c; 1899). Stratton wore glasses to change the retinal images into inverse vision. According to Stratton's (1897b) observation and report, the scene on the first day was "entirely upside down". Any movement of hand or body is laborious and embarrassed. For instance, "in pouring some milk into a glass, [Stratton] must by careful trial and correction bring the surface of the milk to the spout of the pitcher, and then see to it that the surface of the milk in the glass remained everywhere equally distant from the glass's rim" (Stratton, 1897b, p.344). On the third day the subject began "to feel more at home in the new experience" (Stratton, 1897b, p. 349). He could watch his hand when he wrote without hesitating although he still used the wrong hand to grasp an object. Since the fourth day, "actions appropriate to the new visual perceptions frequently occurred without any conflict or apparent tendency to react by a misinterpretation of visual positions" (Stratton, 1897b, p. 352). He could move his hand to the proper position with progressively rare correction when washing hands or having breakfast. Movements were getting easier and less wayward during the latter days. Stratton stated on the fifth day, "When hand and object were both in sight I did not, as a rule, have to calculate or try to find the direction and extent of movement necessary to reach the object, but merely fixed my attention on the thin, and the hand laid upon it without more ado, except for an occasional slight correction of the direction" (Stratton, 1897b, p.355). On the last day Stratton found his body adapted into the state of harmonisation of the new experience especially when he acted actively such as walking or rocking the chair; while when he was in the passive state, e.g., sitting, the old or pre-experimental localization of his body reappeared. After the end of the experimentation, Stratton took off the glasses, for hours he felt that the scene had a "strange familiarity" and "a surprising, bewildering air" (Stratton, 1897c).

together) with the interactions between the body and the surroundings, between the self and others. Every being in every experiential realm is both participating and effecting; moreover, everyone anchors her own lifeworld through her unique body and various dialectical interactions with the surroundings and others. Every body is unique and, on this view, is constructing its own special lifeworld and its meaning. What is revealing is that no body should be taken as "disabled" because any body is "able" in different respects and to different extents; even a "patient", who is in traditional thinking diagnosed as disabled or unhealthy or diseased, is "able" in some sense. The patient's body operates, perceives, experiences, interacts and makes sense with the world in a way that is different from the "normal" people. Thus there should be no body taken as unable (or disabled) to learn as long as she lives. Viewed in this light, every living body experiences and interacts with the world and constructs meanings in its own particular way. Yet this individual nuance is often ignored and replaced by the collective distinctions by age, class, gender, ethnicity, religion, culture and so on. This invites stereotyping, preconception, discrimination, and other forms of suffering and suppression of individual differences.

The above case reveals rich significance for education by showing the vivid body as potent with potentials, flexible and open to changes. This body authors or builds itself as a habitual body through perceiving, responding to and interacting with the world. Yet the body is not fixed or limited within the habits it authors; the habits will be adjusted with change in the surroundings, some of which changes it causes. Paradoxically, the habits reveal the authorship of this body-subject for there is distinctiveness of every habit. The most important point is that life sustains and continues its dynamics all the time whether it be regarded as normal or abnormal, healthy or morbid, weak or strong. Living as learning as well as learning as living is an on-going process that cannot be halted; the living/learning process includes continuous interactions of various lived experiences and movements such as breathing, digesting, seeing, touching, perceiving, sensing, thinking, reflecting, imaging, etc. We live as we learn and we learn as we live. Every moment is meaningful; every lifeworld is meaningful --- to different degrees in different aspects. Thus one of the most important tasks of education is to help students have meaning-rich experience, not merely meaningful. As Merleau-Ponty states:

> *…we shall need to reawaken our experience of the world as it appears to us in so far as we are in the world through our body, and in so far as we perceive the world with our body. But by thus remaking contact with the body and with the world, we shall also rediscover oursel[ves], since, perceiving as we do with our body, the body is a natural self and, as it were, the object of perception. (Merleau-Ponty, 1962, p. 206)*

The above description manifests a very important implication for education: the way of having engaged experience in-depth is to "*reawaken our experience of the world … in the world through our body, and in so far as we perceive the world with our body*". In short, embodied and first-person experience plays the crucial role in learning. This point invites us to consider and develop a learning approach to nature, which can help students to reawaken their own experience of nature through their body, and in so far as they perceive nature with their body. Moreover, it also invites us to consider whether the curricula or subject matters provided for pupils can help students to develop their own embodied experience through learning; whether the curricula can inspiringly help students to construct new meanings to challenge what they have constructed.

Secondly, the lifeworld is the ground for generating various, plural understandings and meanings. The lifeworld as lived and pre-objective experience is the ground for constructing different forms of knowledge according to different themes, in different contexts, for different purposes. As mentioned, lifeworld can be understood as an assemblage of raw experiences which are rough, germinal (seed-like) but full of potentials; it is the realm of pre-objective, embodied and immediate experience. [41] The lived experience is raw, coarse, rough, gross, unstructured,

[41] There may be different interpretations of the concept of "lifeworld" (Lebenswelt). Dreyfus and Todes (1962) take the lifeworld as an intermediation of the adjoining worlds --- prepersonal world and the objective and scientific world. As for Kullman and Taylor (1966), lifeworld is used to denote the pre-objective world but not the everyday experience and scientific world. However, in our opinion, both views are partly right and partly wrong. Lifeworld is the world taken by Husserl and Merleau-Ponty as the fundamental origin for various levels of world such as the scientific and artistic worlds. Everyday life experience is a part of the lifeworld and provides abundant, pre-analysed experiences as the basis of the various levels of world. However, this thesis takes Merleau-Ponty's view as the main perspective. As he states, "The whole universe of science is built upon the world as directly experienced, and if we want to subject science itself to rigorous scrutiny and arrive at a precise assessment of its meaning and

disorganised, etc. Lifeworld is the experience which is "unthematically" apprehended, perceived and sensed and can be understood from numerous perspectives to bring out different interpretations or, in Husserl's term, thematised knowledge. The ambiguous and primal lived experience can be the source of objective and thematic knowledge after undergoing the process of "thematisation", that is a certain way of phenomenological reduction and organisation in a broad sense, including combining, identifying, distinguishing, considering, thinking, valuing, planning and acting (Husserl, 1970, pp. 108-109). Lifeworld is the ground for generating various objective worlds according to different themes through various phenomenological operations or reductions. The thematisation is a process of making visible the invisible, making explicit the implicit, and making intelligible the chaotic and unintelligible. The lived experience is immediate, rich and disordered to some extent. The process of thematisation is a treatment dealing with the lived experience to bring out clear and ordered knowing.

Husserl's and Merleau-Ponty's interpretation may help us to have in-depth understanding of lifeworld. Husserl defines lifeworld as "the grounding soil [*der gründende Boden*] of the 'scientifically true' world and at the same time encompasses it in its own universal concreteness" (Husserl, 1970, p. 131). Moreover, "As lifeworld the world has, even prior to science, the 'same' structures that the objective sciences presuppose in their substruction of a world which exists 'in itself' and is determined through 'truths in themselves'…" (Husserl, 1970, p. 139). Viewed in this light, lifeworld is the embryonic rudiments of experience based on which various abstractions are performed and various results reduced, such as natural science, social science, and art. Every individual can construct his or her many different worlds according to different "vocational attitudes" or "habitual direction of interests" in his or her field of experience:

> *…the "objective" a priori is grounded in the "subjective-relative" a priori of the life-world or…for example, mathematical self-evidence has its source of meaning and source of legitimacy in the self-evidence of the life-world. (Husserl, 1970, p. 140)*

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scope, we must begin by reawakening the basic experience of the world of which science is the second-order expression" (Merleau-Ponty, 2003/1962, p. viii/ix).

In general, lifeworld as the lived experience is the root for producing various kinds of knowledge. This point reveals a very important thought for educators: since lifeworld is the ground for generating meaning, how can we bring more and richer meaning from it? How can we keep or enhance its fertility?

In my view, the engaged approach could be more helpful to evoke richer and more meaning than the disengaged one. As mentioned, the disengaged approach can be characterised by adopting the collective and anonymous experience as the perspective of understanding while the engaged approach is characterised by locating the meaning-construction and meaning-conceiving grounded in personally heterogeneous experience.

In some sense, the disengaged approach adopts or appropriates experience without in-depth deliberation, examination, reflection, attention, enquiry, critique and care. Therefore educators and learners through this approach tend to be uncritical towards their educational experience in relation to curriculum or schools. They tend to accept the ready-made "stuff", which can be understood as collective experience, without further questions. Education tends to be taken as a means to transmit the accepted and established knowledge --- the collective, common, pre-determined and anonymous experience. This approach to learning tends to become memorisation and rote learning and becomes meaning-poor. In schools, almost every thing provided to pupils is pre-organised such as curriculum, teaching plan or time table. Schooling means in this view to lead pupils to learn through the pre-organised process and, in some respects, through a disengaged process. However, it is undeniable that the learning of the well-organised subject matter is important because education is in some respects the transmission of human cultural heritage and intellectual achievements which are disengaged, disembodied and common experience. I do not deny the necessity of learning about collective experience. But it does not mean this disengaged approach to learning should be the only, singular, linear, one-dimesnional way of learning. Furthermore, the disengaged approach to learning could enfeeble the meaning in experience since it does not stress the variously individual interpretations of experience which can generate personally different meanings.

The above discussion thus reminds educators of the significance of the engaged approach to the embodied and immediate lived experience in education which has often been neglected. As revealed, the engaged approach locates the meaning-construction and meaning-conceiving in personally heterogeneous experience. Thus it can bring about various interpretation and meaning from lifeworld. The engaged and disengaged approaches are not mutually sharply discrete ways of dealing with our own experience. They denote two types of ethos or style of dealing with our own experience: the disengaged approach deals with our own experience with less care, thoughtfulness, attentiveness while the engaged one with more attentiveness, deliberation, reconsideration, re-examination, critiques, reflection, caution and care. Thus the disengaged approach pays less heed to the personal interpretation of and interconnection with the learning experience than the engaged one; by contrast, the engaged one deliberates upon the learning experience with more regard, care and effort. They are not completely clear-cut distinct approaches to learning but rather in a continuum. However, according to the above, the disengaged approach could lead learning into relative poverty in meaning while the engaged one tends towards relative abundance in meaning. In other words, the engaged approach holds more potential to bring out more and richer meaning than the disengaged one.

Finally, there is a deep ethical implication in the idea of body-subject. The body-subject anchors individual difference and thereby implies one's own authentic authorship of lived experience. The authorship of a subject confronts the risk of being a nameless part of the anonymous "them". The idea of responsibility can be inferred from a unique individuality because only a special, independent and self-determined person can be responsible for her own action and decision. If any moment of engaged learning occurs, it is experienced personally, vividly, in a body --- in the flesh. Thus an engaged learning is a learning to be responsible because this engaged experience is an action practised by the subject, who is aware of herself as an author responsible for her own action.

If people are taken as an anonymous part of a "group"; their individual differences will be ignored or suppressed. In that case, there is no (personal) authorship, self-decision and responsibility. Therefore, it is very important with regard to education and ethics that every body is seen as unique; every lifeworld of every

body is thus different (but of equal value). The body lives and authors a unique world by coordinating various and complex sensations and perceptions, interacting with the surroundings, and constructing meanings during the process. We may find that the Merleau-Pontian body is in tune with the autonomous and particular subjectivity of the enchanted view.

Drawing on Merleau-Ponty, the idea of body is not understood as a fixed ego but a dynamic and continuously opening-minded self. This perspective is in tune with the philosophy of becoming and the anthropo-non-centric view as mentioned in previous discussions. As Merleau-Ponty describes:

> *I experience my own body as the power of adopting certain forms of behaviours and a certain world, and I am given to myself merely as a certain hold upon the world; now, it is precisely my body which perceives the body of the other and discovers in that other body a miraculous prolongation of my own intentions, a familiar way of dealing with the world. (2003/1962, p. 412)*

What the body constructs is not a closed but an open realm within which the other is experienced as a participant. In other words, the other must be part of my lifeworld. According to Merleau-Ponty, my body and the other's comprise a system, as "two sides of one and the same phenomenon"; my body and the other's compose an existence "of which my body is the ever-renewed trace" and therefore my body can be understood as inhabiting "both bodies simultaneously" (2003/1962, p. 412). In this view, the understanding of one's own bodily experience must be inseparably intertwined with the experience of the other. The body-subject invites intersubjectivity in her own life because the body-subject or bodily self is known through its experience of the other bodies. The bodily self is a being-with-other or co-being. The idea of body holds the potential for overcoming dualism and solipsism and suggesting an understanding of human experience from an inclusive and heterogeneous perspective. Therefore, the self or the identity of the body-subject is constituted and lived through a dynamic, ever-becoming and ever-renewed process of embodied

experiences of "self-and-as-others". There is no fixed "essence" to determine the individual; yet every lifeworld is lived with authorship.

In summary, a disengaged approach to learning can be defined as a way of dealing with our own learning experience with less care, thoughtfulness, attentiveness; it tends to accept and adopt the established normal, normalised collective and anonymous experience as the main part of learning. By taking this approach, learners are discouraged, intentionally or unintentionally, from investing more concentration, attention, thoughtfulness and consideration in the learning activity and tend be passive, inactive, and debilitated in relation to the ready-made material. They are minimally engaged with the object to be learned. Thus the meaning obtained through this approach is meagre, shallow and inert. Learners will not invest much thought and care in what they are learning about; they just learn by rote. In this sense, learning is "shallow and surface", in the terms of Marton and Säljö (1984).

The disengaged approach to learning about nature is more often found in schooling and formal education than the engaged view because what and how pupils learn about are pre-designed and pre-structured in schools. The objectives, aims, purposes and values of curriculum are pre-decided and provided to pupils. Curriculum is often believed to offer the basic and well-arranged parts of collective experience. The learning regulated by curriculum is inevitably a learning of collective experience. In order to achieve the goal of curriculum, educators tend to focus on leading pupils to acquire the collective experience, viz. the accredited basic knowledge and skills rather than helping pupils to develop their own ways of understanding and interpretation of the curriculum. Therefore, the learning led by curriculum can easily turn into the disengaged approach and the meaning acquired could be meagre, enfeebled, weak and stagnant if educators put too much attention on the collective experience.

In contrast, the engaged approach can be defined as the learning approach to experience with more attentiveness, deliberation, reconsideration, re-examination, critiques, reflection, caution and care; this approach tends to locate the meaning-construction and meaning-conceiving grounded on personally heterogeneous experience. Learners taking this approach are encouraged to commit more attention, thought and care to the process and subject matter of learning. The concentration, deliberation and thoughtfulness invested in the process achieve learners' engagement.

This approach can inspire more and richer meaning than the disengaged one by relating personal individuality to the learning process consisting of material and activity. This engaged approach is similar to what Marton and Säljö (1984) call the "deep approach to learning".

The deep learning, or the engaged approach to learning, pays much heed to the lifeworld, to the personal embodied and lived experience. The lifeworld is germinal and holds potential for bringing about rich meaning since it can undergo various thematic operations such as theorising, organising, idealising and refining from different perspectives. Thus an engaged approach to learning is to help learners to relate their own lifeworld to the subject matter, to bring out meanings. The more relations can be established, the more meanings can be constructed, and the more engagement can last. Any subject matter can be learned with much engagement, as long as it inspires much "meaning" to the learner. As Merleau-Ponty states, "All my knowledge of the world, even my scientific knowledge, is gained from my own particular point of view, or from some experience of the world without which the symbols of science would be meaningless" (Merleau-Ponty, 2003/1962, p. ix). The engaged approach to learning may remind educators and learners of the significance of engaged and embodied experience and paying more attention and effort to relate every occurrence of learning to our own personal lifeworld to bring more and richer meaning from every moment.

I do not aim to reject and exclude the disengaged approach from the field of education and that is not possible, anyway, because they are not mutually distinct from each other but lie along, on a continuum, or spectrum. What this chapter aims at is to manifest the significance of lifeworld as lived experience for learning: from the personal and heterogeneous lived experience; the engaged approach could bring more abundant and fertile meaning to education than the disengaged approach; however, current schooling, curriculum and pedagogy tend to lead students to learn through the relatively more disengaged approach. Therefore, educators should bear in mind the importance of learning through engagement and be careful to help pupils to relate learning activities to their own lived experience during the process in schools where the disengaged approach to learning is the mainstream.

7.3 Engaged and Disengaged approaches to Nature as Space and Place

After the elucidation of the meaning of disengaged and engaged learning, we may turn to explore how these two approaches can improve learning about nature in more depth. It can be inferred from the previous discussion that, in general, the way that we learn about nature in school to a great extent relies on a disengaged rather than an engaged approach --- viz. our own personal, direct and immediate experience. However, I do not assert that the disengaged approach to learning needs to be totally abandoned and replaced by the engaged approach in school but rather propose that educators pay more heed to and include the engaged approach in curriculum and teaching. The following discussion aims to manifest the meaning of experience of nature from these two learning approaches and the difference between them; this manifestation may help to draw out ideas for countering the limitations of the disengagement of the current curriculum. The meaning of the concept "nature" can be revealed from the geographical aspect: nature as surroundings or environment. The concepts of "space" and "place" can help us to understand how we learn about the natural environment and how we relate ourselves to nature through disengaged and engaged approaches.

Many authors point out that "space" and "place" are an indivisible dyad to understand our spatial experience (Casey, 1996, 2001; Feld & Basso, 1996; Tuan, 1975, 1977). The dyad of "space" and "place" can be used to explore our experience of nature as environment or landscape. Edward S. Casey (1996) has proposed an interesting question about whether the experience of space precedes or succeeds the experience of place. Following the dominant modernist view, "space" is taken as "absolute and infinite as well as empty and a priori in status" and therefore "place becomes the mere apportionings of space, its compartmentalisations" (Casey, 1996, p. 14). The dominant view can be understood as the disenchanted view which has been discussed earlier in Chapter 5. As Chapter 5 has explicated, the aims of modern

scientists and thinkers are to establish a set or sets of mathematical, objective, universal, and absolute scientific knowledge for explaining nature, and to provide efficient and useful instruments for exploiting nature. “Space” is one of the necessary transcendental conditions for such knowledge to be possible. The conceiving of space in terms of formal essence and taking space as the condition *a priori* of mathematical principles can be understood as a distinguishing feature of modern thinkers including Galileo, Newton, Descartes, et al. For example, Newton divides space into “absolute” and “relative” (or “relational”); however, the latter kind of space belongs to the former kind; it seems an encompassing volumetric void containing and positioning everything (Casey, 1996, 2001). Moreover, Kant (2004), one of the most influential thinkers of Enlightenment modernism, claims that “space” and “time” are transcendental idealities as “two pure forms of sensuous intuition, as principles of knowledge a priori…”; the concept of “space” is “a necessary representation a priori… as the condition of the possibility of phenomena…. [and] the basis for external phenomena”. Overall, from the perspective of these modern thinkers, there seems little doubt that space-time is one of the necessary and fundamental formal conditions for human recognition (Hung & Stables, forthcoming). In this view, the experience of space seems to precede the experience of place.

However, if we return to the positions of the enchanted view, anthropo-non-centrism and the engaged approach, it is doubtful whether or not the general, abstract, absolute and objective space exists; and thus it is more doubtful that the experience of space precedes the experience of place. If we change the view of examining our experience of space carefully and deeply, we might have different findings. As Ong (1969) describes, modern people take for granted the recognition of physical nature as something visually perceived and ignore the visually perceptual embodiment embedded in this recognition. The sense of sight in the modern disenchanted and disengaged approach is taken as the most important channel of knowledge. In other words, the disengaged approach to knowledge depends greatly on vision. According to Ong (1969), this tendency can be called “visualism”. The following two reasons may argue against the tendency of visualism of the disengaged approach and reveal that the experience of space is not anterior but posterior to that of place.

The first reason is related to spatial perception. First of all, if we are in the position of a modernist, we might agree that "space" should be like an external, invisible, general and absolute "container", with no limits. In that case, the visions of the world and the senses of space should be coherent and consistent all the time. If we propose a question, which has been asked by William Molyneux in the 17th century, to the modernists, "Suppose a man born blind, and now adult, and taught by his touch to distinguish between a cube and a sphere [be] made to see: [could he now] by his sight, before he touched them ... distinguish and tell which was the globe and which the cube?"[42] the answer should be "yes".[43] However, it is interestingly found from empirical studies that the truth is not what is supposed to follow from this modernist thinking.

Neurologist Oliver Sacks (1993) proposes two cases in different periods of time which are worth notice. One of the cases was a boy born blind in the 18th century and the other in the 20th century, an adult who lost his vision when he was very young. The two cases demonstrate that these patients have no sense of space as "normal" people do; even when they "regained" their visual ability they could not make sense of their visual and spatial experiences. For example, Virgil, the patient in the second case, after days of surgery and "learning to see" through his tactile memory, could see parts of an object separately such as "an angle, an edge, a colour, a movement --- but would not be able to synthesise them, to form a complex perception at a glance" (Sacks, 1993, p. 5). The above examples show that people could have the sense of lived place without the sense of visual space. The sense of lived space could be established from the bodily movements without visual sensation. People may rely on olfaction, acoustic and tactile experiences and the sense of taste to be aware of a place, to find a place, to posit a place, or to be situated in a place.

The second reason is related to the comparison between the senses of space and place of premodern and modern peoples. If a modernist, disengaged approach to nature is true, then the sense of "space" as an external, invisible, general and absolute

[42] In 1688 and 1693 William Molyneux sent Locke two letters and proposed the same question. The description cited here is extracted from the second letter written in 1693. Locke did not pay much attention to this question when Molyneux proposed it in his first letter. (Jacomuzzi, Kobau & Bruno, 2003)

[43] Interestingly, Locke gave a clear answer in the second edition of *Essay Concerning Human Understanding:* "No" (Jacomuzzi, Kobau & Bruno, 2003; Sacks, 1993).

container should be universal for all people. None the less, according to the studies of anthropologists, the native people give “place” prior value to “space”. After years of study on the desert aboriginal people --- Pintupi --- of Central Australia, anthropologist F. R. Myers points out that the “place” for the Pintupi people is the central or prior feature among all geographical features (Casey, 1996). Another anthropologist Steven Feld (1996) has similar findings. Feld (1996) made his ethnographic research on natives in New Guinea. It is shown from Feld’s (1996) study that the sense of place of the natives consists of sensation, especially sound but not sight. In Feld’s (1996) research, the rainforest where the native people Kaluli live is described by the terms related to various bodily movements and multiple sensations. One of ways to demonstrate the relationship between people and the place they are in is how people name the place where they live. For the Kaluli people, the place is to be heard, touched and felt but not only observed. Sometimes they even hear much which they do not see due to the surrounding region being profuse with exuberant rainforests. The way native people learn about and know environment is different from modern people. “Naming” is one way to signify, learn and relate the object, whether this be an object, a person, a place or a substantial thing. It can be found that the way of naming place of the natives is very different from modern people who depend greatly on visual forms. For example, in Kaluli language, “fele”, “do:m” and “eleb” are names indicating landforms. Here follow the intriguing descriptions about the placenames of Kaluli provided by Feld (1996, p. 104):

> *The term* fele *is related to the word* fe*, “thigh”, and refers to a relatively wide, flat expanse of land that rolls off and downward to either side…*Do:m *segments always imply the existence of* fele *above, below and/or to the sides.* Do:m *has the same phonological shape as the word for “body” in Kaluli…*
>
> *In any case,* fele *and* do:m *are hardly experienced autonomously as interconnected land formations. They are inseparable from the equally prevalent by far more sensuous presence of waterways. …*Eleb *refers to the place in an ascending or arching elevation where creek water*

> *stops…. In fact, water stops by moving along the* do:m, *up toward the* fele. *(Feld, 1996, p. 104)*

Feld (1996) points out that although there is correspondence between terms of the landform used in English and in Kaluli, "there are considerable difficulties both in linguistically glossing and in paraphrastically evoking much sense of the distinctness and interconnectedness of *do:m*, *fele* and *eleb* as either bodily or landscape images. Names like these three inevitably seem far more abstract when one reads about them in English than they must feel to Kaluli people, who experience them directly as signs of the sensual obviousness of place" (Feld, 1996, p. 105).

It can be found from the above that the human/nature relationship in modernist culture is more disengagement-orientated than in premodern culture and this phenomenon is highly relevant to the modernist predilection for visual ability and abstract thinking. The instance above manifests that place-names embody Kaluli people's self-identity and their own lived experience of place, therefore the naming of the place can be understood as an activity of self-locating and self-placing.

Overall, some thoughts in relation to learning about nature can be drawn out of the above: 1) place-naming is a particular engagement of confronting anonymous and meaning-poor space; 2) nature is a pivot of experience of continuously dialectical polarities, e.g. dwelling and venturing, strangeness and intimacy, disentanglement and entanglement, outside and inside, exclusion and inclusion, and so on.

First of all, the activity of "naming" a place can be understood as action of transformation of a detached space into an intimate place, an alienated area into the familiar place and, a disengaged world into an engaged territory. To name a place is an activity to turn an anonymous, homogeneous and occult space into an acquainted, concrete and sensible location; in other words, to name a place is to shed a light on somewhere in darkness by bestowing meaning on it. As Steele (1981, p.9) defined it, the sense of place is "an experiential process created by the setting, combined with what a person brings to it" (cited in Manzo, 2003, p.47). Feld's study resonates with Ong's (1969) view that the modernist culture does not give as much value to the sensations other than vision as the preliterate cultures do.

To name a place is one embodied activity of how we relate ourselves to the environment, to give the meaning of a place to a space, to give a personal or private meaning to it. It is also an act of locating and placing oneself in an unfamiliar environment, an act of constituting the relationship between oneself and the detached surroundings, an act of finding and constructing meaning of one's world. That is why the sense of place is prior to that of space in the context of phenomenology. The phenomenology of the sense of place of native people echoes with the view. To think in another way, there is a world or a field for us to act, within and towards which we can act, and finally, the meaning of which is partly, never completely revealed through the acting. Through the act the boundary between the abstract space and the existential space has been demarcated. This is an environment where we can hold sway and operate through our own experience.

Secondly, nature can be understood as a pivot of dialectical experience. The experience of nature is always in change. Nature at the first impression seems to be an unfamiliar, dangerous, unintelligible and wild place. Human geographer Tuan (1986, p. 11) has pointed out that the words "forest" and "foreigner" are both derived from the Latin *foranus*, meaning "situated on the outside". According to J. S. Mill (1999, p. 262), nature could be understood as the synonym of "anarchy and reign of terror", bringing about "injustice, ruin, and death, by a hurricane and a pestilence". The natural world seems to be the opposite realm of the human world and human home in contrast can be understood as the most "humanised" realm. Human experience of wilderness may denote the experience of the non-human world as a whole or, in Oelschlaeger's (1991) or Birch's (1995) terms, the experience of the "other". Nature in this sense can be taken as the synonym of wilderness, brutality and irrationality and thus be understood as the epitome of the highest estrangement and alienation. On this point we may understand why in much recent human history, we seem to have aimed at overcoming nature by various technologies and instruments to transform (or tame) the strange and unfamiliar nature into a familiar and docile place. This process is in tune with the movement of disenchantment and the operation of an anthropological machine.

On the one hand, human beings seem to have the desire to conquer and tame a ferocious nature into a subdued place; on the other, human beings seem to have the

lust for its wilderness, wildness, vigour, unpredictable changes, viz. “naturalness”. As poet Shelley describes in *Alastor*,

> *Many a wide waste and tangled wilderness*
> *Has lured his fearless steps; and he has brought*
> *With his sweet voice and eyes, from savage men,*
> *His rest and food. Nature’s most secret steps*
> *He like her shadow has pursued… (Shelley, 1994, p. 4)*

Nature can be found to be both the epitome of strangeness and the source of inspiration and sense of novelty. Thus Shelley’s poem trenchantly portrays the human eagerness for novelty and difference, for new experiences in unknown places, especially among wild nature. Viewed in this light, it can be inferred that nature as the source of wilderness, wildness, strangeness and estrangement orientates a potential process of learning difference. The experience of nature is an on-going process of paradoxical dialectics: humans launch a journey in pursuit of wild nature by means of domesticating the wild. It could be understood, on the one hand, as a process of pursuing the strangeness by means of familiarising it and, on the other, as a paradoxical process of conserving the familiar by means of metabolising the novelty. Learning is a like process of devouring, digesting and assimilating novel things into components on the ground of what has already been absorbed and composed. Therefore we are eager to experience surprise, strangeness, peculiarity and extraordinariness in nature; however, we also attempt to obtain solace, quietness, safety and intimacy from nature.

7.4 Summary

In closing, let us return to the educational concern of this chapter: How can the disengaged and engaged approaches benefit our learning and learning about nature? Let me summarise these two learning approaches.

The disengaged approach to learning gains more nourishment from the philosophy of being, the view of nature with divine *telos*, the disenchanted view and anthropocentrism rather than the philosophy of becoming, the view of nature with non-divine evolutionary *telos*, the enchanted view and the anthropo-non-centrism. Educators taking the disengaged approach tend to focus on experience with the characteristics of fixedness, disembodiment, collectivity, and anonymity and to take education and curriculum as a means for the normalisation, standardisation, homogenisation and socialisation of learners. Educators and learners taking the disengaged approach tend to accept the established knowledge of the subject matter and pay less attention, concentration and care to develop new conceptualisations, thus learning tends to be "surface" rather than "deep". When learners take this approach to nature, they are likely to learn about nature by rote. The learning of nature takes place only within classroom or in textbook; it can hardly be related to the learners' own lifeworld. In this sense, "nature" means unimportance or even nothing to them; the meaning of nature is poor, or "thin". Yet the impoverishment results from the disengagement of learning process, not from "nature" itself. Also, the mainstream assumptions about nature in this approach are easily accepted without further critique and examination. For example, nature is taken as a mere resource for human exploitation; humanity as rational beings should have mastery over our earth. Or, nature is mechanistic, static, predictable, controllable, mathematised and should be subjugated to humans who are rational, emotionless, indifferent, impartial, nonpersonal and objective. The most far-reaching significance is that people adopting this disengaged approach are liable to take themselves as anonymous and ignore their own personal responsibility. With regard to nature, people who are disengaged from nature will hardly relate their own lived experience to nature and hardly take care and responsibility for their individual acts towards nature --- because nature does not mean much to "me". We can only take our own personal responsibility and pay attention to the object upon which our own actions act, when it has particular meaning

to “me” as an irreplaceable individual. Therefore, a learning for being responsible needs to be engaged as much as possible.

The engaged approach is based on the philosophy of becoming, the view of nature with non-divine evolutionary *telos*, the enchanted view and anthropo-non-centrism. This approach pays heed to the personal and particular individual lived experience that is embodied, dynamic, changing, transient and private. This learning approach to nature may encourage pupils to conceive various meanings of nature from their own lifeworld, to find or to invent the connection between their own lived experience and nature. For example, it has been argued that one of the bodily acts particularly pertaining to environment is to name the place. Ostensibly, naming seems to be an abstract activity because it is an invisible act which is signifying with a concept. However, the key point is that the process of naming the place through the manifold embodied sensations may be more meaningful than through unitary sensation especially vision. In addition, it has been argued that to name a place through personal embodied experience is a means to make the place personal and unique. Thus it is also a process of self-rootedness or self-localisation in this place. In this sense, a learning that is attentive, responsive and sensitive to nature is a process of *learning* of self-locating, self-positing, and self-dwelling. It relates not only to finding the position of oneself in an environment, but also to positing oneself in this environment. It is not only to learn where we are, but also to learn to invent/create where we are.

Thus nature can be more closely related to the lifeworld and be conceptualised as “source” since the concept of source denotes the features of dynamics, unpredictability, and inexhaustibility; furthermore, taking the engaged approach, people might give more care, attentiveness and attention to nature. It is more important for educators to encourage learners to take this approach to learning because every person is taken as a particular and unique being; this unique individual who cannot escape from her own responsibility must learn to be responsible. The responsibility can be taken only by the person who makes her own decision and action; nobody can take responsibility on the other’s behalf; no one can live the other’s life, although we do partly appropriate and we are partly appropriated in the other’s lived experience. This implication could point towards a rich ethical learning about nature,

ourselves and others as ourselves. Anything that I decide or act towards nature should be my own personal responsibility which cannot be shifted to anyone else.

To summarise, the engaged approach to learning can be characterised by the following features:

1) treating subject matter with attentiveness, care, concentration, responsiveness, sensitivity, consideration, reflection, examination, scrutiny, critique and responsibility;
2) continuously referring to one's own lifeworld;
3) being opening-minded towards and generating differences and meanings;
4) authoring unique subjectivity and promising responsibility through and through.

PART III

Education through Meaningful Conception of Nature

…[I]f a man would be alone, let him look at the stars.…The stars awaken a certain reverence, because though always present, they are inaccessible; but all natural objects make a kindred impression, when the mind is open to their influence. Nature never wears a mean appearance. … Nature is a setting that fits equally well a comic or a mourning piece. … In the woods, is perpetual youth … In the woods, we return to reason and faith…

(Emerson, Nature, 1849)

There was a chaotic formation of matter, before the existence of Heaven and Earth. It was so noiseless, so shapeless, all alone and unchanging, It is moving around endlessly. It can be the mother of Heaven and Earth. I do not know its name, but call it Tao. If I must I name it Great Reality. … Tao is great, Heaven is great, Earth is great and Humanity is also great. There are four great realities in the universe, and Humanity is one of them.

(Lao Tsu, Dao Te King)

8

Enriching Education about and for Nature through an Authoring View

The above discussions explore the meanings of the concept of nature and its educational implications in the context of five themes. This exploration is set out on the concern of the impoverishment of meaning in education. This pitfall can be detected from the current curriculum in which the concept of nature is oversimplified and taught without in-depth reflection. In order to have a more meaningful education and life, it may help to bring a more meaningful conception of nature to education. The exploration of the concept of nature guided by different themes, paradoxically, does not give a simple, clear and distinct definition of nature but reveals the numerous possibilities of understanding of nature. The more the concept of nature is interrogated, the more complicated conceptions can be found. This does not mean that the exploration of nature is futile; on the contrary, it shows that if the concept of nature can be understood from an appropriate view or views, its abundant and profound relational meanings can be revealed and its inspiration for education can thus be more widely and variously developed. How can nature be understood in so many, rainbowlike ways? One of the reasons is that an understanding of nature is interdependent with concepts of humanity, world view, divinity, value, and nonhumans. The meaning of nature is embedded in the network of relationships of other concepts. What matters is that different perspectives on nature result in different understandings of different networks of relationships in which nature is involved. Some networks relate the concept of nature to many different ideas, concepts, images; they inspire many different kinds of emotions, responses and experiences and thereby

give rich meanings; these kinds of networks embody multiple relations and meanings. Some relate nature to scanty ideas and experiences; such perspectives produce simple relations between the concept of nature and other ideas or experiences and thus bring impoverished meanings to human understanding.

Following this, current oversimplification in curriculum takes for granted understandings about nature, humanity, human/nature relationship and knowledge which are poorly related. The previous scrutiny has argued that these poorly-relational underpinnings are philosophy of being, the concept of nature with divine *telos*, the disenchanted view, anthropocentrism and the disengaged approach. These notions are hereafter generally referred to as "anonymising orientation". The concept of "anonymity" used here denotes the state of being anonymous, viz. the state of being no different from the other. This view describes a perspective which tends to understand beings in the world in an abstract and general way. In the terms of social phenomenologists Alfred Schütz (1962) and Maurice Natanson (1973), we meet anonymous people in daily life or social life; these anonymous people are known as "the postal clerk", "the poker player" and "the miser" but not in person. Their personal features are anonymous and irrelevant to me. According to Schütz and Natanson, these people matter to me in terms of the roles that they play in my social life but not their personal, individual particularities. They are equivalent, homogenised and atomic beings that Schütz (1962) and Natanson (1973) refer to as "the social types", not vivid, living and characteristically different persons. In respect of general social phenomena, it seems tenable to take social typification as one perspective on the understanding of human life. This general, common typification assumes a certain "sharing of constructs and interpretations" among people's daily lives and thereby this "sharing of constructs and interpretations" could provide the basis for communication and coexistence (Natanson, 1973). None the less, this anonymising view might not express and tend to ignore individuality and individual differences which could be tremendously important in education. As Natanson reminds us,

> *The consideration of the problem of typicality suggests a delimitation on what interests and concerns men in daily life, a motivational curb, a pragmatic motif of sorts. (Natanson, 1973, p. 17)*

The anonymising view could result in the ignorance of individuality since "the specificality of my or your perception of an object is irrelevant to the way in which it is understood or handled for ordinary purposes" (Natanson, 1973, p.17). Viewed in this light, the social typification is a certain technique of homogenisation and disembodiment. Therefore, students and pupils, who are supposed to be regarded by educators as unique individuals with irreducible differences and thereby treated with consideration of their personal traits, needs, concreteness and uniqueness, could be taken as people of a kind without considering their personal idiosyncrasy. What concerns me more in this thesis is that this perspective could impoverish the meaning of life and education because human beings and educational ideas and practices, whose diversity and heterogeneity should be respected and attended, now, could be neglected through homogenisation and disembodiment.

In contrast, as argued, there are different ways of understanding the concept of nature which are different from the above "anonymising orientation". These views can bring richer and more multifarious (multiple and various) meanings to education and thereby help to confront the oversimplification. These views include the philosophy of becoming, the view of nature with non-divine *telos*, the enchanted view, anthropo-non-centrism and the engaged approach. These five views are hereafter referred to in summary as "authoring orientation". There is no clear-cut boundary between the anonymising orientation and the authoring orientation; each other represents a tendency or emphasis in understandings of nature and their expressions in education. For example, an educator can make acquaintance with his/her students by accessing their personal details of registration information or by individual learning through interaction between the teacher and the students in person. The former approach can be generally understood as the anonymising orientation, while the latter the authoring orientation. The crucial point of an authoring orientation is that it is an on-going process of the understanding and interpretation of human beings and the world. Even if an educator makes acquaintance with his/her students through their

individual embodied interaction, it does not mean that this teacher can achieve a perfect understanding of students and maintain a reliable and long-term relationship with them. This is because the understanding of every human being cannot be and is not fixed; on the contrary, it is changing and shifting. No one interaction of a particular moment in a particular occasion can produce a perennially valid framework for reading and understanding of anyone.

The authoring view stresses the following characteristics in education: becoming, subject in deconstruction and reconstruction, embodiment, engagement, anthropo-non-centric subject, individuality, inter-subjectivity, and lived experience. The concept of "author" is used to mark out the process of living and learning as personal, individual, particular, unique, irreplaceable and non-human-centred. The individual embodies and is embodied in her attitudes, decisions and actions; yet she is not a closed monad. A subject is open to and invites participation and contribution of the other subjectivities. She is an irreplaceable, unique author who is an agent of her lifeworld, who is authoring her lived experience with spoken or written signs, symbols and words or non-verbal expression which are contextualised with other subjectivities. Thus the subject in education is a learning subject as well as an object to be learned from and with. She authors a track of her own but that track includes many other people in the "pick and mix" of all the people who have influenced and flowed into her. The revealing, making visible and making sense of the authorship is a process of learning as living; it is a learning to recognise that the body-subject inevitably implies individuality, and that the individual uniqueness and particularity are inevitably embedded in her own decision and action, as well as in everyone else's. More importantly, to admit authorship is to admit inescapable responsibility. We speak, and act, in our own name and in no-one else's. We can do no other.

In the last chapter, I shall attempt to give a summary of the whole thesis about what has been found and how it can extend meanings for education. The exploration of this thesis starts from the existing over-simplified understanding about nature in curriculum. The over-simplified view of nature results from an unbalanced and excessive reliance on anonymising-oriented philosophical assumptions. My suggestion is that giving weight to the authoring-oriented view in education can help to improve the oversimplified curriculum and pedagogy.

Part I has identified two main oversimplifications in the present curriculum. The Taiwanese curriculum guidelines have been taken as an example for detailed discussion. These two main oversimplifications are defined by this thesis as "homogenisation" and "disembodiment". "Homogenisation" denotes the view that nature is understood in the curriculum as composition of many homogeneous components such as atoms. "Disembodiment" refers to the notion that the pedagogic methods in curriculum rely too heavily and narrowly on cognitive and abstract thinking. These two oversimplifications are symptoms indicating that there are hidden philosophical assumptions about nature, humanity and their relationship. These assumptions need to be exposed, criticised and examined.

The aims of Part II, consisting of five chapters, are to criticise how "nature" has been conceptualised and learned about in the mainstream curriculum through the anonymising view, and to demonstrate how it can be understood and learned about through a different authoring view. For example, the ideas of determinism and mechanism are imported by the philosophy of being, the view of nature with divine *telos;* the emotionless, indifferent and objective attitudes towards nonhumans are supported by the disenchanted view. The implications for education include the features of standardisation and normalisation. In this view, educational institution and educators are taken as the tool aiming for cultivating (constructing or manufacturing) the "normal" member of the group. In order to shape pupils into the "standard" and "entitled" people in the name of citizen with basic cognition and skills, curriculum and school are taken as instruments and workplace for schooling as "educational engineering". Schooling as machining tends to lead pupils to learn to be anonymous, normalised members of the collectivity by fostering their disengagement and estrangement from their own, individually subjective, lived experience. As German philosopher Bernhard Wadenfels (1994, cited and translated by Stoller, 2000, p. 181, n.3) states, "What is peculiarly paradoxical about anonymity is that I and You have the feature of no one, no-body, not merely despite, but in having a name". To be anonymous can be understood as a rupture between the individual and one's own action, between the body-subject and one's own lived experience; anonymity is the renunciation, denial or unawareness of one's own responsibility. All in all, the anonymising-oriented education tends to discourage the generation of meaning and

the sense of responsibility in education and life by fashioning heterogeneous learners into homogeneous people with the same model. Children are schooled and normalised into adults like their educator-minders.

In order to confront the pitfalls caused by the anonymising-oriented education, I propose the authoring orientation which is grounded on five contrasting views for conceiving nature, humanity and education: the philosophy of becoming, the view of nature with non-divine *telos*, the enchanted view, anthropo-non-centrism and the engaged approach. It has been shown from the previous chapters that this authoring orientation in general could help us to understand humans, nature and the relationship in between, in the concepts of process, becoming, interaction, inexhaustibility, dynamics, flexibility, creativity, lived experience, embodiment, and engagement. On this ground, education is conceived as an on-going process pregnant with inspirations, differences, otherness, alterity, challenges and rich, plural meanings.

Overall, the educational implications of the authoring-oriented view can be depicted in three respects: meaning of education in general, education about and for nature and nature in a particular system of education (the Taiwanese curriculum).

8.1 Meaning of the Authoring-oriented Education

The implications of the authoring view for education can be revealed in the respects of metaphysics, epistemology, educational anthropology, and ethics.

1) The authoring view in respect of metaphysics

The previous discussion has shown that the metaphysical position that the authoring view takes is a philosophy of becoming. Following this, the reality of living process is changing and becoming; "the" fixed or static "Reality" in life, society or history is a self-contradictory notion. It is neither desirable nor possible. Living organisms of all kinds are continuously changing and evolving together, mutually creating and being created by each other. Living organisms

are distinguished from non-living matter by acquiring the ability to reproduce and multiple themselves. A traditional view of education tends to define ideas and practice on the ground of philosophy of being to build a normalised, standardised, measurable, predictable and controllable educational model. This static view of education actually sets limits to what and how to learn and teach during the process of education. Although life as a changing process cannot be completely regulated and controlled, the static view limits, determines and narrows down, to some extent, the possibilities and meanings of life and education.

In contrast, the authoring view values the more dynamic, becoming aspect of life. This view can be understood as an evolving thought; the previous discussion about *telos* of nature shows that the living process of beings, as individuals or as species, is a process of interaction and interrelation between beings and surroundings. In other words, it is an evolving process of mutual creation and being created. There seems to be a certain purpose guiding the development of species or individuals. However, the exploration of the previous chapters shows that, in order to develop a meaningful education, a purpose directing the development of organisms preordained or predetermined by God or some other existence beyond the process is not necessarily helpful for improving education because everything is in process and changing, conceiving of an external fixed purpose could limit the educational process and its dynamics. For example, in a highly credentialist society, the major goal of education is taken as acquiring diploma rather than experiencing deep learning process. Credentials are taken as educational ends which are predetermined and external to educational process. In this case, it is more important for educators to provide and students to gain an easier and quicker diploma than to have rich and meaningful learning experiences during educational process. In this view, the end of education is more important than its process and activity. The unbalanced emphasis of the "end" of education or schooling can impoverish the meanings implied in the educational process, such as intellectual acquisition, psychological satisfaction, friendship, joyfulness, wonders, engagement, sense of participation, sense of devotion, collaboration with others, and laboriousness.

What is possibly worse is that the over-emphasis of credentials tends to result in "instrumentalisation" of education. Educational activities are exerted for the sake of credentials which are predetermined and external to the educational process. From this perspective, individual differences are insignificant; students need to adapt themselves into this instrumentalised educational model. Eeducation is used to machinise (and tame) students rather than help students to be free, active, critical, reflective, sensitive, attentive, responsive, responsible and creative.

In contrast, from the authoring view, education can be broadly understood as the process of having meaningful experiences and lives. It is not a certain specified model for one to be adapted into but a vivid practice in life. A purpose which is helpful for bringing out a meaningful education and understandable is within the process. The purpose is formed and shaped during the process; it is an outcome of the evolving process. "Process" can be understood from various perspectives. It can be understood as a process of the evolution of a particular biological species; it can also be understood as a series of actions of a single individual; furthermore, every part of the series of action can be separately taken as a small-scale process. Therefore, the process of life of any individual can be seen as composing innumerable small-scale processes. Every piece of process is an interaction with the surroundings and the other people within the surroundings.

2) The authoring view in respect of epistemology

Grounded on philosophy of becoming, the authoring view takes knowledge and the way of acquiring knowledge as constructing in the process of interaction between subjects and natural and cultural world. How and what to know in this view can be understood as products of interaction between subjects and culture, society and history. The constructed knowledge could be common for many and incommensurably personal. For example, a nation or country for patriots is real to fight for, while for anarchists, its validity is arguable. The common knowledge originates from human commonalities, such as history, society, tradition, language and culture. Common knowledge is constructed and

shared by humanity via languages, as a collective. The authoring view reveals the limitation of common or collective knowledge: that is, common knowledge cannot provide fully appropriate explanations for personal lifeworld.

Since everyone's lifeworld is heterogeneously different and unparalleled, the meanings implied are personally irreplaceable and different. The personal meaning of one's life is crucial for one to be different from others, not to be identified with others. The irreplaceable meaning of life can be understood as the key to make one an irreducible and irreplaceable one but not any others in this world. Therefore, it is important to highlight the epistemology of personal knowledge and meaning in education. It is the central point of the authoring view of education in respect of epistemology.

3) The authoring view in respect of educational anthropology

The focus of the authoring view in the respect of educational anthropology is to demonstrate the meaning of the dynamic self. From this perspective, an individual establishes his or her selfhood or identity during the changing process of living and learning. This view takes an individual as an irreplaceable author of him- or herself who incorporates different roles: an inventor, an adventurer, a rational agent, and a perceptive poet. These roles are not totally separated but interdependent.

How can a person as an author be an inventor? As Heraclitus states, "Upon those who step into the same rivers, different and different waters flow" (Kirk, 1951, p. 36). World and life appearing stable and static actually change continuously. This world is often taken for granted so that tiny, slow or subtle changes are easily ignored. If it can be seen from different perspectives with careful attention, the differences will be made visible. Furthermore, creativity and innovativeness emerging from the process of differing, changing, renewing and becoming will be become explicit. Although not all differences emerging are useful or helpful in every respect, yet it is more possible to find creativity that can contribute to the world in abundant differences than in scanty differences. Education adopting a philosophy of becoming gives more support and encouragement for the production of differences and creativity than

adopting philosophy of being. An authoring-oriented education taking up the position of philosophy of becoming encourages an education of creativity.

An author is an adventurer who takes the risk of being open to new experiences. An education of creativity can be understood in relation to the process and the goal. Such an education encourages a process of learning and teaching to be inventive and experimental and thereby supports the innovations of curriculum or pedagogic methods. Moreover, such an education intends to cultivate individuals to be and dare to be creative --- the courage to be, and to become different. To be creative, in some sense, implies to be different from and challenge the accepted and established "correctness", orthodoxies, theories and practices. Thus a creative person has "courage" to challenge and make breakthroughs in the existing establishment. The cultivation of such courage in students is one of the important meanings of the authoring-oriented education.

An author is an actor and agent. Things are not intending agents. As mentioned, every piece of process is an interaction with the surroundings and the other people within the surroundings. Every interaction implies decisions and actions. Thus the authoring view of education emphasises the co-evolving interaction and interrelation of individuals and their surroundings and it encourages individuals to decide their own actions and to set goals or purposes for the processes. The learning of decision-making and action is an activity for the learner to devote oneself to the here and now moments of living. A learner is free to create him- or herself on the one hand, and his or her authorship is created, on the other hand, through the interaction with others within the surroundings. The subjectivity of this individual as an author embraces other subjectivities; thus the subjectivity of this author is not solipsistic but inter-subjective, embedded in the context where he or she is situated. Thus an agent acts in the relationships with others. I cannot say "I" without you, to say it to.

An author is a poet. A poet is also an inventor, an adventurer and an agent. As Rorty (1989) describes it, a poet is a self-creator who recognises and appreciates contingency as the reality of language, selfhood and community. The Rortian poet is an ironist who attempts to articulate with private language rather than common vocabularies since "the opposite of irony is common sense"

(Rorty, 1989, p. 74). Thus the Rortian poet as ironist creates meanings which are unique and personal. In this sense, this Rortian poet can be understood as the author for whom this thesis argues. However, what distinguishes a poet from an inventor, an adventurer and an agent is her affectivity to the world. The author as poet is sensitive to the others' emotions and feelings in the world and responds to them. The poet's response to the world does not merely rely on her rationality but also affectivity or, in Rorty's term (1993b), sentimentality.

4) The authoring view in respect of ethics

The authoring view of education has deep implications for ethics of responsibility. As mentioned, the human image in the authoring view is an irreplaceable and unique individual; she authors herself (and she is authored) in every moment of inter-action. She is responsible for every decision and action that she makes. This understanding is significant for countering the tendency of escaping individual responsibility from the anonymising perspective. People tend to avoid individual responsibilities and duties in the name of "they" (Heidegger, 1962) --- it seems to be right and safe to do things as people (they) do. First of all, "do as people do" keeps one away from the danger of resisting convention and customs. Resistance of convention or tradition is dangerous because it could make one different from people and no longer one of them. Secondly, if a public decision or action brings unpleasant results, no specific person should be blamed or take responsibility. The self-anonymising and the implying irresponsibility often appear in the pretext of identification of a group. I do not oppose democratic mechanism for making decisions for public. What needs to be emphasised is that people taking part in the process of public decision-making should be very conscious of fact that his or her own will is a part of it. He or she is the one who contributes to the result, who should be responsible for it. From the perspective of authoring view, everyone is an author of her own deeds; the author should be responsive, attentive and responsible for herself, for others and for the environment which is influenced by her decision and action. This understanding could be fundamental for developing an authentic ethical education.

8.2 Authoring-oriented Education about and for Nature

The above has shown that the concept of nature can contribute towards the understanding of education as a dialectical process and, moreover, deep engagement can enhance this process. This process can be unpicked in depth from two aspects.

1) First of all, there are three roles that nature can play during the process of learning: (1) learning about nature: nature as an object that is to be learned about; (2) learning in nature: nature as the surroundings within which learning takes place; and (3) learning from nature: nature as a guide which provides tacit and non-verbal inspiration.

   (1) Nature is a significant source of knowledge and inspiration. It can be understood from various perspectives with various tools and technologies and thereby provides different kinds of knowledge. For example, Galilean-Newtonian science provides us with a view of a world which contains features of, say, three-dimensional spatiality and linear temporality. While new physics, such as Einstein's relativity theory, challenges, or extends a Galilean-Newtonian worldview. "In Newtonian physics, time, like space, was considered absolute and independent. With Einstein, notions of 'before', 'now' and 'after' in an arrow of time going in one direction become relative terms". As for general relativity, "it describes the gravitational field as a space-time continuum 'curved' or 'warped' in the presence of matter…puts an end to absolute time…With the general theory of relativity, space and time are now thought of as dynamic qualities in an interrelated and interdependent universe" (Marshall, 1992, pp. 376-377). However, although Galilean-Newtonian science is severely challenged by new physics, it does not mean that it is

invalid. On the level of daily life experience, Galilean-Newtonian science still works well and provides useful explanations. For most ordinary purposes we take it, and a flat, stationary earth, for granted. On a micro-world, quantum-mechanical level, the limits of its validity appear and new physics provides new explanations. The point is that nature can be understood as a source of knowledge. Yet the acquisition of knowledge depends not only on nature but also on human beings. The process of acquiring knowledge from nature can be an active process of meaning-constructing through distilling and thematising lived experience of nature (Husserl, 1970; Merleau-Ponty, 2003/1962).

(2) Nature is an important environment for learners to be situated and positioned within. Nature is an environment which cannot be replaced by any man-made environment. Some built environments may provide human beings with partly similar but not exactly the same experience of nature as, for instance, in a zoo or garden. The natural changes of nature itself are not yet completely predictable or controllable. The resulting human responses, such as fears, wonders, joyfulness and surprise, are also unpredictable parts of our own nature. Thus nature as surroundings is a unique and valuable place. The importance of nature as an environment for education can be understood in the respect that it is a "proto-field" for learning about life which develops into various kinds of subject, such as biology, and botany. However, the significance of nature for learning is that nature is the field for us to dwell in, to have direct and bodily experience both with other human and with non-human beings and thereby helps to develop authentic learning.

(3) Nature can be a guide. As mentioned, nature is a source of inspirations; it can be understood as many and various aspects as possible and arouses various responses, feelings and thoughts. Thus nature can be understood as a guide, a teacher (Wordsworth, 1888). Many authors agree that if human beings can keep themselves in attentive, sensitive and responsive

receptivity for nature, more inspirations will emerge (Wordsworth, 1888, 1984). There are two very important points in learning from nature: solitude and humility.

Firstly, nature is wordless. This means that nature does not speak human language directly. If nature can be taken as a guide or a teacher, her teaching is speechless. Thus nature as a tacit guide can be also understood as a text from a broad view (Stables, 1997). Silent learning from nature occurs without words; it is also a tacit process of reading of non-verbal text. If a wordless dialogue between learners and nature can arise, it is an intimate encountering between inward and outward. Company may spoil the possibility of the speechless learning from nature; human language is convenient and available for use so that it preoccupies our mind. Thus solitude is a very important condition for non-linguistic learning to occur. Many authors (Caranfa, 2007; Rainsford, 2003) are aware of the significance of solitude for education, for example, the aforementioned Romantics including Rousseau (1962), Wordsworth (1888, 1984), Emerson (1849) and many other poets or philosophers.

Secondly, in order to learn from a speechless or non-verbal teacher, being humility, or modesty, awareness of not-knowing is also a key. Nature is not like a person, who can be actively intending, meaning or "wanting to say" anything to anyone. Nature cannot actively or consciously teach human beings. Lessons of nature have to be acquired through interaction between nature and humans. Human beings need to be careful, attentive and responsive in humbleness in order to learn things that humans cannot give: "One impulse from a vernal wood,/ May teach you more of man;/ Of moral evil and of good/ Than all the sages can" (Wordsworth, 1984, p. 131). In the terms of Halpin (2006), to learn from nature needs not only human direct experience of, but also human power of imagination about, nature. To learn from nature, or to be led by nature, is a dynamic process within which the learner has her own personal unique contact with nature. To be humble in learning from

nature is crucial because this attitude demonstrates that this learning is not sheer human creation *ex nihilo*, a fiction in mind, but the outcome inspired by and interacted with a source *both* external to human beings and internal, inside us. This point is important for conceiving the human image as an author from the perspective of my authoring-oriented education: this author is a living being who is independently self-determined and inter-dependent with others. She is solitary but not alone, unique and plural.

2) In order to optimise the fruits of learning about nature, which means to make learning as meaningful and interesting as possible, learners are required to be or led to be deeply engaged in the process. The learning process could be mutually reciprocal for both learners and nature so long as it is deeply engaged.

Learning could be superficial or deep. As mentioned in Chapter 7, learners give more attention, attentiveness, care, mindfulness, regard, heed, responsiveness and responsibility to the object that is learned about in a deeply engaged approach than in a superficially engaged or less engaged or disengaged one. Consequently, learners acquire more and richer meanings in a deeply engaged approach than in a disengaged one. The deeply engaged learning does more help than the disengaged one for learners to connect the particular moment of learning with other lived experiences, to relate present to past and towards future, to create new and different meanings from what has been known, to interact with other subjects within the surroundings, to construct relationships with the world. In this light, more mutual reciprocity can emerge in the process of deep engagement than in that of "impartiality", "objectivity", non-personal, disinterested disengagement.

All in all, the authoring view of education stresses the inextricability of the concepts of nature and human and thus the current curriculum and pedagogic methods can be improved by continuous re-conceptualisation and re-examination of the taken-for-granted assumptions. "Human" and "nature", or "human" and "nonhuman" are

inextricable and interdependent concepts not merely from the perspective of natural science or ecology, but also from the perspective of language. Human survival subsists on nonhumans; human understanding encompasses the meaning of nonhumans. Thus to teach about the human world and natural world as separate should not be assumed as a matter of course. Educators and curriculum designers always need to bear in mind that the education about the human/nature relationships is an on-going changing, complicated and dynamic process. As revealed, the concept of nature or nonhumans in the present curriculum is mainly taught in the fields of science education and environmental education. It has been demonstrated that there is a strong tendency in these fields to take nature as an external and real natural world full of static, mechanistic, predictable, controllable and exploitable entities. Accordingly, educators might need to pay more heed to the complex and multiple conceptions of "nature" during the process of teaching. The process of education is an on-going process of questioning and interrogating. Viewed in this light, the following questions may be prompts for educators to keep reflecting and refreshing the meaning of nature in curriculum and pedagogic methods:

1) What explicit or implicit meanings are referred to when the term "nature" is written or spoken in curriculum and teaching process?
2) What assumptions are implied when "nature" is an issue that has been taught?
3) What kind of conception of nature is accepted and taken for granted? Is it justified?
4) What kind of conception of nature has been denied or ignored by the current curriculum and why?
5) How do we implement the authoring-oriented education of nature? What kind of practical pedagogical methods are in tune with the authoring-oriented education?
6) How can we acquire as many and rich meanings as possible from the lifeworld? How can we relate our own lifeworld to nature?
7) What kind of attitude and action towards nature will be inspiring and desirable for life?
8) How can we position ourselves in nature? How can I learn myself through this positioning?

9) How do I unveil nature through unveiling myself? And, how does nature unveil me through its being unveiled?
10) What meaning of nature has not been considered during the process of leaning? How different can nature be?

8.3 Nature in Curriculum from the Authoring-oriented Perspective

At this section, let me return to the Taiwanese curriculum guidelines to demonstrate how educational philosophising might benefit practices. The discussions above may be helpful for conceiving an improvement of Taiwanese curriculum guidelines. The analysis in Chapter 2 shows the general pitfalls of over-simplification and the particular problems of the G1-9 CG. With regard to the general pitfalls, I suggest that continuous questioning and critique during the process of learning might keep the learning alive and meaningful. With regard to the particular problem in the Taiwanese curriculum, I propose these suggestions in more detail:

1) Three problems of the Taiwanese curriculum have been identified in Chapter 2 including mis-juxtaposition, arbitrary combination of irrelevant ideas and ambiguous environmental ethical assumption. A more thoughtful, deliberate and unequivocal pragmatics of language in curriculum should be achieved; the meaning of the term or concept related to curriculum should be under careful and scrupulous consideration and clarification before being used in the curriculum. For example, sensory abilities, such as observation and reasoning, like inference should not be simply taken as performance of the same kind. These unequivocal pragmatics might include:

    - The meaning of the key terms should be carefully re-examined and given clear and distinct definition, e.g. nature, environment, nonhuman,

and human. Although these terms may not have clear, distinct and specific definitions, the implied ambiguities should be exposed

- The implied philosophical assumptions should be highlighted and discussed. The taken-for-granted assumptions should be exposed, pinpointed, re-examined and criticised such as substance metaphysics, mechanism, atomism, anthropocentrism, and modernist, positivist scientific views. Educators and learners are invited to ponder upon the related questions: What kind of philosophical assumption such as epistemology, metaphysics, ethics, aesthetics, etc. could be involved and interpreted? What kind of effects or debates will be caused if different philosophical assumptions are introduced and adopted?

2) Learning about nature in the Taiwanese curriculum should be more diverse and innovative in its contents and pedagogical methods. As revealed, nature is chiefly taken as a synonym of natural environment from the perspective of substance metaphysics; therefore, nature is taken as an external, static, fixed and detached world; modern scientific methodology is taken as the sufficient instrument for learning about nature. This modernist view tends to limit the meaning of how and what to learn about nature and should not dominate the perspectives of curriculum and pedagogical methods. Different views and approaches to learning could be included such as minority views, Taiwanese indigenous perspectives, alternative practices, etc. These differences might inspire more fruitful conceptions of nature and human beings.

3) With regard to cultural context, it may be more difficult for educators in Taiwan to take the perspective of the authoring view than the anonymising view. Greatly influenced by Confucianism, Taiwanese society in modern times tends to understand human beings in terms of their social relations and statuses rather than their personal characteristics and uniqueness (King, 1985; Ling and Shih, 1998; Munro, 1980). There is a strong collective tendency in Confucian tradition to take persons as social existences priori to

independent beings. I do not deny contextualisation as a part of human existence. What concerns me is that the collective perspective of Confucian tradition tends to define human beings as social beings "only"; human beings are determined by and fixed within their social relationships. What concerns me more is that the social relationships are taken as static and determined, then human beings embedded in such unchangeable relations fail to make self-decision and become inauthentic, anonymous and, worse, irresponsible.

One bit of evidence showing the tendency towards anonymity can be found in the conservative reactions to curriculum reform in recent years in Taiwan. There are two cornerstones of the Taiwanese curriculum reform: the deregulation of the monopolised publication of textbooks by government in 1996, and the mandate of the new curriculum guidelines since 1999. Since then, different versions of textbooks have begun to be published and school teachers are entitled to choose from various versions[44]. In some sense, this situation can be understood as a phenomenon of liberalisation and democratisation: educators can enjoy more freedom to choose textbooks and compile teaching materials according to their teaching profession. Yet a call for one single unified version of textbooks has appeared in recent years; supporters including educators and scholars claim that multiple versions of textbooks impose heavy burden on learners because they need to take national examinations. Without ascertainment of which version of textbook will be the source of test questions, learners have to memorise the contents in all versions.

From my point of view, the resistance of free choice and the appeal to one single unified curriculum result from the implied anonymising view. It can be found from this phenomenon that educators anonymise themselves and circumvent the risks and responsibilities of making curriculum decisions.[45] Moreover, they take learning as a mechanical process with a

[44] Textbooks which are available for choice must pass the examination of National Examining Board in advance.

[45] There can be more analysis and discussions on this issue from the authoring view. They are related to politics of curriculum which may go beyond the scope of this thesis. The discussions can be developed in future studies.

very simple aim of memorising. We can find a strong tendency towards an anonymising view about knowledge, learning process and curriculum implied in this conservative reaction to educational reform in Taiwan, Viewed in this light, the emphasis of the authoring view is important for constructing a more responsible and responsive attitude towards education in Taiwan.

8.4 Epilogue: self-authoring as anchoring meanings in the flux of life

In closing, the exploration of this thesis manifests the meanings of nature from different aspects; the manifestation helps to define my educational perspective as the authoring view which embraces philosophy of becoming and embodied subjects. This philosophical position admits the reality of life and nature as dynamic becoming. Everything is in flux. Every living being is becoming, every moment. With every breath I take, I change, and I am changed by, my world. However, the authoring view manifests a truth of life: a life is achieved by an author; an author creates her own changeable but distinctive self-identity who withstands and enjoys becoming through continuously self-creating. This process can be a continuous dialectic of writing and obliterating, constructing and deconstructing, including and excluding, being born, growing, reproducing, decaying, dying and being reborn. It is also a process of interaction between internal and external nature, individual and collective, self and aliens, nature and human nature. Learning about nature inescapably implies learning about human beings ourselves and *vice versa*. Learning about nature in a poorly relational way implies learning about my own living in meaning-poor terms.

Some words from Merleau-Ponty help to illuminate the human/nature intertwinement, interdependence and inter-revealing:

> *Regarding Nature, the concern was to study it as an ontological leaf--- and in particular, regarding life, the concern was to study the*

> *unfolding of the leaf of Nature---regarding the human, the concern is to take him at his point of emergence in Nature. (Merleau-Ponty, 2003, p. 208)*

Life, nature and humans are inextricable in some sense. Education is to shed light on the process of the dynamic interrelationship. Thus the above words might be extended as follows: *Regarding education, the concern is to keep the process anew, alive and meaningful*. Yet what educators need to bear in mind is that the meaning only exists for and can be established by an embodied individual. Meaning is the meaning for *me* rather than anyone or human-in-general; an object as well as nature can have different meanings to different persons. The meaning must be achieved and experienced by the irreplaceable individual; this is the process of authoring: the writing of my own meaning in life. Education from this perspective can be understood as the task of encouraging the learner to author her own lifeworld. It seems an insignificant task, compared with many great ideals taken as the aim of education; however, the small task might bring significant and unparalleled meaning to every one of us.

References

Abram, D. (1995) Merleau-Ponty and the voice of the earth. In M. Oelschlaeger (Ed.) *Postmodern environmental ethics* (Albany: State University of New York Press), pp. 57-78.

Abram, D. (1996) *The spell of the sensuous* (New York: Vintage Books).

Adler, M. (1984) *The Paideia Program: an educational syllabus* (London: Collier MacMillan).

Agamben, G. (2002) *The open: man and animal* (Stanford: Stanford University Press).

Aiken, H. D. (1948) Introduction. In D. Hume, *Dialogues concerning natural religion* (New York: Hafner Press), pp. vii-xvii.

Aler, J. (1964) Schooling for creativity. *The Journal of Aesthetics and Art Criticism*, 23(1), pp. 81-95.

Allen, D. J. (1937) Nature, education and freedom according to Jean-Jacques Rousseau, *Philosophy*, 12(46), pp. 191-207.

Allen, D. M. (1952) Towards a natural teleology. *The Journal of Philosophy*, 49(13), pp. 449-459.

Aristotle (2004) *Physics*, translated by R. P. Hardie and R. K. Gaye. eBooks@Adelaide 2007 Available online at: http://etext.library.adelaide.edu.au/a/aristotle/physics/ (accessed 3 March 2007).

Attifield, R. (1983) *The ethics of environmental concern* (Oxford: Blackwell).

Attfield, R. (2004) Rousseau, Clarke, Butler and critiques of deism, *British Journal for the History of Phiolsophy* 12(3), pp. 429-443.

Ayala, F. J. (1970) Teleological explanation in evolutionary biology. *Philosophy of science*, 37(1), pp. 1-15.

Bacon, F. (2004) *The new organon*, eBooks@Adelaide 2004 available online at: http://etext.library.adelaide.edu.au/b/bacon/francis/organon/ (accessed 26 July 2007).

Badmington, N. (2003) Theorizing posthumanism. *Cultural Critique*, 53, pp. 10-27.

Barnes, J. (1979) *The pre-Socratic philosophers: volume 1: Thales to Zeno* (London: Routledge & Kegan Paul).

Bate, J. (1991) *Romantic ecology: Wordsworth and the environmental tradition* (London: routledge).

Beck, U. (1995) *Ecological enlightenment: essays on the politics of the risk society* (New Jersey: Humanities Press).

Benn, A. W. (1911) The origin of the atomic theory. *Mind. New Series*, 20(79), pp. 394-398.

Berryman, S. (2004a) Leucippus. The *Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/leucippus/ (accessed 14 January 2008)

Berryman, S. (2004b) Democritus. The *Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/democritus/ (accessed 14 January 2008).

Berryman, S. (2005) Ancient atomism. The *Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/atomism-ancient/ (accessed 14 Jan 2008).

Betegh, G. (2004) Plato's cosmic teleology: a critical notice of Thomas Kjeller Johansen, Plato's Natural Philosophy. A Study of the Timaeus-Critias. *RHIZAI* II.2, pp. 255-269.

Biehl, J. & Staudenmaier, P. (1995) *Ecofacism: lessons from the German experience* (CA: AK Press). Available online at: http://www.spunk.org/texts/places/germany/sp001630/ecobib.html (accessed 19 August 2007).

Bingham, C. W. (2008) Derrida on teaching: the economy of erasure. *Studies in Philosophy and Education*, 27, pp. 15-31.

Birch, T. H. (1995) The incarceration of wilderness. In M. Oelschlaeger (Ed.) *Postmodern environmental ethics* (Albany: State University of New York Press), pp. 137-162.

Boas, G. (1936) Presuppositions of Aristotle's Physics. *The American Journal of Philology*, 57(1), pp. 24-32.

Bodnar, I. (2006) Aristotle's natural philosophy. *The Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/aristotle-natphil/ (accessed 23 January 2008).

Bohm, D. (1980) *Wholeness and the implicated order* (London, Routledge & Kegan Paul).

Bohm, D. (1988) Postmodern science and a postmodern world. In D. R. Griffin (Ed.) *The reenchantment of science: postmodern proposals* (Albany, State University of New York Press), pp.57-68.

Bohm, D. (1990) A new theory of the relationship of mind and matter, *Philosophical Psychology 3(2)*, pp. 271-286. Available online at: http://members.aol.com/Mszlazak/BOHM.html (accessed 11 April 2007).

Bonnett, M. (1999) Education for sustainable development: a coherent philosophy for environmental education? *Cambridge Journal of education*, 29(3), pp. 313-324.

Bonnett, M. (2002a) Education for sustainability as a frame of mind. *Environmental Education Research* 8(1), pp. 9-20.

Bonnett, M. (2002b) Sustainability as a frame of mind and how to develop it. *The Trumpeter*, 18(1), pp. 1-9.

Bonnett, M. (2003) *Retrieving nature, education for a post-humanist age. Journal of Philosophy of Education Special Issue, 37(4).*

Bonnett, M. (2004) Lost in space? education and the concept of nature, *Studies in Philosophy and Education, 23,* pp.117-130.

Bonnett, M. (2007) Environmental education and the issue of nature, *Journal of Curriculum Studies,* 39(6), pp. 707-721.

Braun, B. (2004) Querying posthumanism. *Geoforum,* 35, pp. 269-273.

Burnet, J. (1892) *Parmenides: fragments*. Available online at: http://philoctetes.free.fr/parmenides.pdf (accessed 4 January 2008).

Burnet, J. (1912) *Heraclitus: fragments.* Available online at: http://philoctetes.free.fr/heraclite.pdf (accessed 4 January 2008).

Burnet, J. (1920) *Early Greek philosophy* (London: A & C Black Ltd). Available online at: http://wwwclassicpersuasion.org/pw/burnet/egp.htm (accessed 1 January 2008).

Bury, R. G. (1916) The origin of atomism. *The Classical Review,* 30(1), pp. 1-4.

Butterfield, H. (1949) *The origins of modern science 1300-1800* (London: G. Bell and Sons LTD).

Butts, R. E. (1990) Teleology and scientific method in Kant's Critique of Judgment. *Noûs,* 24(1), pp. 1-16.

Callicott, J. B. (1995) Intrinsic value in nature: a metaphysical analysis. *The Electronic Journal of Philosophy* 3. Available online at: http://ejap.louisiana.edu/EJAP/1995.spring/callicott.1995.spring.html (accessed 19 May 2008).

Caranfa, A. (2007) Lessons of solitude: the awakening of aesthetic sensibility. *Journal of Philosophy of Education,* 41(1), pp. 113-127.

Carr, D. (1970) Translator's introduction. In Edmund Husserl, *The crisis of European sciences and transcendental phenomenology* (Evanston: Northwestern University Press), pp. xv-xliii.

Carr, W. (1997) Philosophy and method in educational research. *Cambridge Journal of Education,* 27(2), pp. 203-209.

Carr, W. & Kemmis, S. (1986) *becoming critical --- education, knowledge and action research* (Philadelphia: Falmer).

Casey, E. S. (1996) How to get from space to place in a fairly short stretch of time: phenomenological prolegomena. In S. Feld & K. H. Basso (Eds.) *Senses of place* (New Mexico: School of American Research Press), pp. 13-52.

Casey, E. S. (2001) Between geography and philosophy: what does it mean to be in the place-world? *Annals of the Association of American Geographers,* 91(4), pp.683-693.

Cataldi, S. L. & Hamrick, W. S. (2007) (Eds.) Merleau-Ponty and environmental philosophy: dwelling on the landscapes of thought (Albany: State University of New York Press).

Cherniss, H. (1951) The characteristics and effects of pre-Socratic philosophy. *Journal of the History of Ideas,* 12(3), pp. 319-345.

Clutton-Brock, J. (1995) Aristotle, the scale of nature and modern attitudes to animals. *Social Research,* 62(3), pp. 421-440.

Coates, P. (1998) *Nature: western attitudes since ancient times* (Cambridge: Polity Press).

Cohen, M. P. (1996) Comment: resistance to wilderness. *Environmental history,* 1(1), pp. 32-42.

Coleridge, S. T. (2005) *The poems of S. T. Coleridge* (London: William Pickering). Available online at: http://rpo.library.utoronto.ca/poem/3301.html (accessed 1 March 2008).

Collingwood, R. G. (1945) *The idea of nature* (Oxford: Clarendon Press).

Collingwood, F. J. (1960) *Philosophy of nature* (Eaglewood Cliffs: Prentice-Hall Inc).

Copleston, F. (1966a) *A history of philosophy, volume 1: Greece and Rome --- from Socrates to Plotinus* (London: Burns and Oates Ltd).

Copleston, F. (1966b) *A history of philosophy, volume II: medieval philosophy --- Augustine to Scotus* (London: Burns and Oates Ltd).

Corbeil, M. J. V. (2003) *Process environmental philosophy*. (Dissertation, M. A. University of North Texas).

Cosan, C. (1998) Aristotle's anatomical philosophy of nature. *Biology and Philosophy* 13, pp. 311-339.

Cothran, D. & Ennis, C. (2000) Building bridges to student engagement: communicating respect and care for students in urban high schools. *Journal of Research and Development in Education,* 33, pp. 106-117.

Cronon, W. (1996) The trouble with wilderness or, getting back to the wrong nature. *Environmental History,* 1(1), pp. 7-28.

Curry, P. (2003) Re-thinking nature: towards an eco-pluralism. *Environmental Values,* 12(3), pp. 337-360.

Curry, P. (2007) Post-secular nature: principles and politics. *Worldviews: Environment, Culture, Religion* 11, pp. 284-304.

Daston, L. (1998) The nature of nature in early modern Europe. *Configurations,* 6(2), pp. 149-172.

Deckers, J. (2004) Christian and ecological ethics: the significance of process thought and a panexperientialist critique of strong anthropocentrism. *Ecotheology,* 9(3), pp. 359-387.

De Laguna, G. A. (1962) The role of teleonomy in revolution. *Philosophy of Science* 29(2), pp. 117-131.

Derrida, J. (1969) The ends of man. *Philosophy and Phenomenological Research* 30(1), pp. 31-57.

Derrida, J. (2002) The animal that therefore I am (more to follow). *Critical Inquiry* 28(2), pp. 369-418.

Devlin, K. (1996) Good-bye Descartes? *Mathematics Magazine* 69(5), pp.344-349.

Doong, S. (2008) Taiwan's new citizenship curriculum: changes and challenges. In D. L. Grossman, W. O. Lee & K. J. Kennedy (Eds.) *Citizenship curriculum in Asia and the Pacific* (Hong Kong: Comparative Education Research Centre), pp. 43-59.

Dreyfus, H. D. & Todes, S. J. (1962) The three worlds of Merleau-Ponty. *Philosophy and Phenomenological Research*, 22(4), pp. 559-565.

Dunlap, T. R. (1996) Comment: but what did you go out into the wilderness to see? *Environmental History*, 1(1), pp. 43-46.

Eckersley, R. (1992) *Environmentalism and political theory* (Albany: State university of New York).

Emerson, R. W. (1849) *Nature: addresses and lectures*. Available online at: http://www.emersoncentral.com/nature1.htm (accessed 4 March 2007).

Evernden, N. (1992) *The social creation of nature* (Baltimore: The John Hopkins University Press).

Ewert, G. D. (1991) Habermas and education: a comprehensive overview of the influence of Habermas in educational literature. *Review of Educational Research*, 61(3), pp. 345-378.

Feenberg, A. (1999) *Questioning technology*. (London: Routledge).

Feld, S. (1996) Waterfalls of song: an acoustemology of place resounding in Bosavi, Papua New Guinea. In S. Feld & K. H. Basso (Eds.) *Senses of place* (New Mexico: School of American Research Press), pp. 91-135.

Feld, S., & Basso, K. (1996) Introduction. In H. S. Feld & K. H. Basso (Eds.) *Senses of place* (New Mexico: School of American Research Press), pp. 3-12.

Fieser, J. (2006) Editor's instruction. *The natural history of religion* (New York: MacMillan). Available online at: http://www.cfh.ufsc.br/~conte/hume-fieser4.pdf (accessed 14 May 2008).

Finn, J. D. & Voelkl, K. E. (1993) School characteristics related to student engagement. *Journal of Negro Education*, 62(3), pp. 249-268.

Fredricks, J. A., Blumenfeld, P. C. & Paris, A. H. (2004) School engagement: potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), pp. 59-109.

Garrard, G. (1998) The Romantics' view of nature. In David, E. Cooper & Joy A. Palmer (Eds.) *Spirit of the environment: religion, value and environmental concern*. (London: Routledge), pp. 113-130.

Ginsborg, H. (2004) Two kinds of mechanical inexplicability in Kant and Aristotle. *Journal of the History of Philosophy,* 42(1), pp. 33-65.

Ginsborg, H. (2005) Kant's aesthetics and teleology. *The Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/kant-aesthetics/ (accessed 4 August 2007).

Glacken, J. C. (1967) *Traces on the Rhodian Shore* (Berkeley: University of California Press).

Götz, I. L. (1981) On defining creativity. *The journal of Aesthetics and Art Criticism*, 39(3), pp. 297-301.

Gray, J. G. (1952) Heidegger's "Being". *The Journal of Philosophy*, 49(12), pp. 415-422.

Grey, W. (1993) Anthropocentrism and deep ecology. Australasian *Journal of Philosophy*, 71(4), pp. 463-475.

Griffin, D. R. (1988a) Introduction: the reenchantment of science, in D. R. Griffin (Ed.) *The reenchantment of science: postmodern proposals* (Albany, State University of New York Press), pp.1-46.

Griffin, D. R. (1988b) Introduction: postmodern spirituality and society, in D. R. Griffin (Ed.) *Spirituality and society: postmodern visions* (Albany, State University of New York Press), pp.1-32.

Griffin, D. R. (1988c) Introduction to SUNY series in constructive postmodern thought. In D. R. Griffin (Ed.) *The reenchantment of science: postmodern proposals* (Albany, State University of New York Press), pp. ix-xii.

Griffin, D. R. (2000) *Religion and scientific naturalism: overcoming the conflicts* (Albany, State University of New York Press).

Habermas, J. (1971) *Knowledge and human interest* (Boston: Beacon).

Habermas, J. (1996) *The Habermas Reader* (Oxford: Polity Press).

Halpin, D. (2006) Why a Romantic conception of education matters. *Oxford Review of Education,* 32(3), pp. 325-345.

Harper, G. M. (1923) *William Wordsworth: his life, works and influence* (New York: Charles Scribner's Sons).

Harris, W. (1994) Heraclitus: the complete fragments: translation and commentary and the Greek text. *Humanities and the Liberal Arts: Greek Language and Literature: Text and Commentary*. Middlebury College. Available online at: http://community.middlebury.edu/~harris/Philosophy/heraclitus.pdf (accessed 31 December 2007).

Harrison, G. P. (1992) Descartes on animals. *The Philosophical Quarterly,* 42(167), pp. 219-227.

Harrison, R. P. (1992) *Forests: the shadow of civilization* (Chicago: The University of Chicago Press).

Hays, S. P. (1996) Comment: the trouble with Bill Cronon's wilderness. *Environmental History,* 1(1), pp. 29-32.

Heidegger, M. (1961) *Introduction to Metaphysics* (Garden City, NY: Doubleday).

Heidegger, M. (1962) *Being and time* (Blackwell Publishing).

Heidegger, M. (1971) The origin of the work of art, *Poetry, language, thought* (New York: Harper & Row), pp. 17-87.

Heidegger, M. (1977) The question concerning technology. L. William (Ed.) *The question concerning technology and other essays.* (New York: Harper & Row), pp. 3-35.

Heidegger, M. (1998) Letter on "Humanism" (1946) *Pathmarks* (Cambridge: Cambridge University Press), pp. 139-176.

Heisenberg, W. (1999) *Physics and philosophy: the revolution in modern science* (New York: Prometheus Books).

Held, D., McGrew, A., Goldblatt, D. & Perraton, J. (1998) *Global transformations: politics, economics and culture* (Cambridge: Polity Press).

Hilgevoord, J & Uffink, J. (2006) The uncertainty principle, *The Stanford Encyclopedia of Philosophy* (July 2006 Revised Edition), in Edward N. Zalta (Ed.), available online at: http://plato.stanford.edu/entries/qt-uncertainty/ (accessed 3 May 2007).

Horkheimer, M. & Adorno, T. W. (1972) *Dialectic of Enlightenment* (New York: Continuum).

Hoy. D. C. (1979) Forgetting the text: Derrida's critiques of Heidegger. *Boundary* 2 8(1), pp. 223-236.

Hume, D. (1948) *Dialogues concerning natural religion* (Indianapolis: Bobbs-Merrill).

Hung, R. (2007) Is ecological sustainability consonant or dissonant with human rights? Identifying theoretical issues in peace education. *Journal of Peace Education*, 4(1), pp. 39-55.

Hung, R. (2008) Educating for and through nature: a Merleau-Pontian Approach. *Studies in Philosophy and Education.* 27(5), pp. 355-367.

Hung, R. & Stables, A. (2008) Can we experience nature in the lifeworld? An interrogation of Husserl's notion of lifeworld and its implication for environmental and educational thinking. *Indo-Pacific Journal of Phenomenology*. Volume 8, Special Education: *Education*. Available online at: http://www.ipjp.org/issues/sep2008special.htm

Hung, R. & Stables, A. (forthcoming) Lost in space? located in place: Geo-phenomenological exploration and school. *Educational Philosophy and Theory.*

Husserl, E. (1913/1931) *Ideas pertaining to a pure phenomenology and to a phenomenological philosophy. First book: general introduction to a pure phenomenology* (London: George Allen & Unwin LTD).

Husserl, E. (1970) *The crisis of European sciences and transcendental phenomenology* (Evanston: Northwestern University Press).

Hwang, J-J. & Chang, C-Y. (2003) Curriculum study in Taiwan: retrospect and prospect. In W. F. Pinar (Ed.) *International handbook of curriculum research* (New Jersey: Mahwah), pp. 595-605.

Jacomuzzi, A. C., Kobau, P. & Bruno, N. (2003) Molyneux's question redux . *Phenomenology and Cognitive Sciences*, 2, pp. 255-280.

Jensen, B. B. & Schnack, K. (2006) The action competence approach in environmental education. *Environmental Education Research* 12(3-4), pp. 471-486.

Kant, I. (1786/1985) *Philosophy of material nature Book II: Metaphysical foundations of natural science* (Indianapolis: Hackett Publishing company).

Kant, I. (1914) *Critique of Judgment* (London: Macmillan) Available online at: http://ia311542.us.archive.org/0/items/critiqueofjudgem00kantuoft/critiqueofjudgem00kantuoft_djvu.txt (accessed 5 August 2007).

Kant, I. (1950) Prolegomena to any future metaphysics (Indianapolis: The Bobbs-Merrill Company).

Kant, I. (1952) The critique of pure reason, the critique of practical reason , and other ethical treatises, the critique of Judgment (Chicago: William Benton).

Kant, I. (2000) *The critique of judgement*. (Blackmask Online). Available online at: http://www.e-text.org/text/Kant%20Immanuel%20%20-%20The%20Critique%20of%20Judgement.pdf (accessed 10 March 2007).

Kant, I. (2004) *The critique of pure reason.* eBooks@Adelaide. Available online at: http://etext.library.adelaide.edu.au/k/kant/immanuel/k16p/ (accessed 15 June 2007).

Keller, C. (1988) Toward a postpatriarchal postmodernity, in D. R. Griffin (Ed.) *Spirituality and society: postmodern visions* (Albany, State University of New York Press), pp.63-80.

Kennedy, K. J. (2008) Globalised economies and liberalised curriculum: new challenges for national citizenship education. In D. L. Grossman, W. O. Lee & K. J. Kennedy (Eds.) *Citizenship curriculum in Asia and the Pacific* (Hong Kong: Comparative Education Research Centre), pp. 13-26.

Kheel, M. (1995) From heroic to holistic ethics: the ecofeminist challenge, in: James P. Sterba (Ed.) *Earth ethics: environmental ethics, animal rights, and practical applications* (New Jersey: Prentice-Hall Inc.), pp. 217-230.

King, A. Y. C. (1985) The individual and group in Confucianism: a relational perspective. In D. Munro (Ed.) *Individualism and holism: Studies in Confucian and Taoist Values* (Michigan: The University of Michigan), pp. 57-70.

Kirk, G. S. (1951) Natural change in Heraclitus. *Mind, New Series*, 60(237), pp. 35-42.

Kirk, G. S. (1960) Popper on science and the Presocratics. *Mind. New Series* 69, pp. 318-339.

Kirk, G. S. (1961) Sense and common-sense in the development of Greek philosophy. *Journal of Hellenic Studies,* 81, pp. 105-117.

Kirk, G. S. & Raven, J. E. (1957) *The pre-Socratic philosophers: a critical history with a selection of texts* (Cambridge: Cambridge Press).

Kroeber, K. (1994) *Ecological literary criticism: romantic imagining and the biology of mind.* (New York: Columbia University Press).

Kullman, M. & Taylor, C. (1966) The pre-objective world of Merleau-Ponty. M. Natanson (Ed.) *Essays in phenomenology* (Netherland: Martinus Nijhoff), pp. 116-136.

LaFreniere, G. F. (1990) Rousseau and the European roots of environmentalism. *Environmental History Review*, 14(4), pp. 41-72.

Laguna, T. D. (1921) The importance of Heraclitus. *The Philosophical Review* 30(3), pp. 238-254.

Laing, B. M. & Litt, M. A. D. (1937) Hume's dialogues concerning natural religion. *Philosophy*, Vol. 12, No. 46, pp. 175-190.

Langsam, H. (1994) Kant, Hume, and our ordinary concept of causation. *Philosophy and Phenomenological Research*, 54(3), pp. 625-647.

Lao Tsu. *Dao Te King*. Available online at: http://home.pages.at/onkellotus/TTK/English_Cheng_TTK.html#Kap25 (accessed 4 March 2007).

Law, W-W. (2002) Educational reform in Taiwan: a search for 'national' identity through democratization and Taiwanisation. *Compare* 32(1), pp. 61-81.

Law, W-W. (2004a) Globalization and citizenship education in Hong Kong and Taiwan, *Comparative Education Review*, 48(3), pp. 253-273.

Law, W-W. (2004b) Translating globalization and democratization into local policy: educational reform in Hong Kong and Taiwan, *International Review of Education*, 50(5-6), pp. 497-524.

Lee, B-W. (2008) *A discourse analysis on curriculum standards of primary education in Taiwan (1952-1993).* Master Dissertation (Taipei: Taipei Municipal University of Education).

Lee, D. (1965) Introduction, *Timaeus and Critias* (Penguin Books), pp.7-26.

Lee, C-M. (2004) Changes and challenges for moral education in Taiwan. *Journal of Moral Education,* 33(4), pp. 575-595.

Leiss, W. (1972) *The domination of nature* (New York: George Braziller).

Lennox, J. (2006) Aristotle's biology. *The Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/aristotle-biology/ (accessed 23 January 2008).

Leopold, A. (1949) A *sand county almanac,* (Oxford: Oxford University Press).

Levi, A. W. (1958) Substance, process, being: a Whiteheadian-Bergsonian view. *The Journal of Philosophy,* 18, pp. 749-761.

Light, A. (2000) What is an ecological identity? *Environmental Politics,* 9(4), pp. 59-81.

Light, A. & Rolston III, H. (2003) (Eds.) *Environmental ethics: an anthology* (Oxford: Blackwell).

Ling, L. H. M. & Shih, C-y. (1998) Confucianism with a liberal face: the meaning of democratic politics in postcolonial Taiwan. *The Review of Politics,* 60(1), pp. 55-82.

Little, J. P. (1969) Heraclitus and Simone Weil: the harmony of opposites. *Forum for Modern Language Studies,* V(1), pp. 72-79.

Liu, X. (1998) On the concept of aturalness (tzu-jan) in Lao-Tzu's philosophy, *Journal of Chinese Philosophy,* 25(4), pp. 423-446.

Locke, J. (1975) *An essay concerning human understanding* (Oxford: Oxford University Press).

Logan, B. (1998) Hume and Kant on *knowing* the deity. *International Journal for Philosophy of Religion,* 43, pp. 133-148.

Lusthaus, D. (1990) Re-tracing the human-nature vs. world-nature dichotomy: Lao Tzu's hermeneutics fro world-building. *Journal of Chinese Philosophy, 17,* pp 187-214.

Maehle, A-H. & Tröhler, U. (1987) Animal experimentation from antiquity to the end of the eighteenth century: attitudes and arguments. In N. A. Rupke (Ed.) *Vivisection in historical perspective* (London: Routledge), pp. 14-47.

Mann, S. J. (2001) Alternatives perspectives on the student experience: alienation and engagement. *Studies in Higher Education,* 26(1), pp. 7-19.

Manzo, L. C. (2003) Beyond house and haven: toward a revisioning of emotional relationships with places, *Journal of Environmental Psychology*, 23, pp. 47-61.

Mao, C. J. (1997) Constructing a new social identity: Taiwan's curricular reforms of the nineties. *International Journal of Education Reform*, 6(4), pp. 400-405.

Mao, C. J. (2008) Fashioning curriculum reform as identity politics – Taiwan's dilemma of curriculum in new millennium, *International Journal of Educational Development*, 28, pp. 585-595.

Mardiros, A. M. (1936) Determinism and its ethical implications. *Australasian journal of Philosophy*, 14(2), pp. 145-152.

Marsh, G. P. (1874) *The earth as modified by human action: a new edition of man and nature* (London: Sampson Low, Marston, Low and Searle).

Marshall, P. (1992) *Nature's web: rethinking our place on earth* (New York: Paragon House).

Marton, F. & Säljö, R. (1984) Approaches to learning. In F. Marton, D. Hounsell & N. Entwistle (Eds.) *The experience of learning* (Edinburgh: Scottish Academic Press), pp. 36-55.

Mashalidis, S. (2003) Heraclitus thinking: implications for philosophy of education. *Interchange*, 34(1), pp. 23-33.

Mayr, E. (1992) The idea of teleology. *Journal of the History of Ideas*, 53(1), pp. 117-135.

Mayr, E. (1999) Understanding evolution. *TREE*, 14(9), pp. 372-373.

Mayr, E. (2001) The philosophical foundations of Darwinism. *Proceedings of the American Philosophical Society* 145(4), pp. 488-495.

McMahon, B. & Portelli, J. P. (2004) Engagement for what? beyond popular discourses of student engagement. *Leadership and Policy in Schools*, 3(1), pp. 59-76.

McPherson, T. (1957) The argument from design. *Philosophy*, vol. 32, no. 122, pp. 219-228.

Merchant, C. (1983) *The death of nature: women, ecology and the scientific revolution* (San Francisco: Harper).

Merchant, C. (1992) *Radical ecology* (New York: Routledge).

Merchant, C. (1995) *Earthcare: women and the environment* (New York: Loutledge).

Merleau-Ponty, M. (1962) *Phenomenology of perception* (London: Routledge & Kegan Paul Ltd).

Merleau-Ponty, M. (1964a) Cézanne's Doubt. In *Sense and Non-Sense* (Evanston: Northwestern University Press), pp. 9-25.

Merleau-Ponty, M. (1964b) Eye and mind. In *The primacy of perception* (Evanston: Northwester University Press), pp. 159-192.

Merleau-Ponty, M. (1970) *Themes from the lectures at the Collège de France 1952-1960* (Evanston: Northwestern University Press).

Merleau-Ponty, M. (1988) *In praise of philosophy and other essay*s (Evanston: Northwestern University Press).

Merleau-Ponty, M. (2003/1962) *Phenomenology of perception* (reprint) (London: Routledge & Kegan Paul Ltd).

Merleau-Ponty, M. (2003) *Nature: course notes from the Collège de France* (Evanston: Northwestern University Press).

Merleau-Ponty, M. (2004) *The world of perception* (London: Routledge).

Metz, T. (2007) The meaning of life. *The Stanford Encyclopedia of Philosophy*. Available online at: http://plato.stanford.edu/entries/life-meaning/ (accessed 17 July 2008).

Mezirow, J. (1981) A critical theory of adult learning and education. *Adult Education*, 32(1), pp. 3-24.

Midgley, M. (2003) *The myths we live by* (London: Routledge).

Mill, J. S. (1999) Nature. In J. Benson (Ed.) *Environments, ethics and human concern* (The Open University), pp.251-266. Available online at: http://www.lancs.ac.uk/users/philosophy/texts/mill_on.htm#Top (accessed 12 November 2006).

MOE(1993) *Curriculum standards for elementary education* (Taipei: Ministry of Education).

MOE (1995) *Curriculum standards for secondary education* (Taipei: Ministry of Education).

MOE (2006) *Grade 1-9 curriculum guidelines*. Available online at http://teach.eje.edu.tw/9CC/brief/brief1.php (accessed 29 October 2007).

Morito, B. (2002) *Thinking ecologically: environmental thought, values and policy* (Halifax: Fernwood Publishing).

Mortensen, P. (2000) Taking animals seriously: William Wordsworth and the claims of ecological Romanticism. *Orbis Litterarum,* 55, pp. 296-311.

Munro, D. (1980) The concept of "interest" in Chinese thought. *Journal of the History of Ideas,* 41(2), pp. 179-197.

Naess, A. (1989). *Ecology, Community and Lifestyle: Outline of an Ecosophy*, (Cambridge: Cambridge University Press).

Naess, A. (2005) The Norwegian roots of deep ecology. *The Trumpeter,* 21(2), pp. 37-41.

Nash, R. F. (1989) *The rights of nature: a history of environmental ethics* (Wisconsin: The University of Wisconsin Press).

Natanson, M. (1973) Phenomenology and the social sciences. In M. Natanson (Ed.) *Phenomenology and the social sciences, Vol. I.* (Evanston: Northwestern University Press), pp. 3-46.

Nealon, J. T. (1992) The discipline of deconstruction. *PMLA,* 107(5), pp. 1266-1279.

Nelson, E. J. (1947) A defense of substance. *Proceedings and Addresses of the American Philosophical Association,* 20, pp. 491-509.

Nielson, J. R. (1931) Philosophical implications of modern physical science, *The Scientific Monthly, 32(6),* pp. 546-555.

Norton, B. (1984) Environmental ethics and weak anthropocentrism. *Environmental Ethics,* 6, pp. 131-148.

Noxon, J. (1964) Hume's agnosticism. The *Philosophical Review* 73(2), pp. 248-261.

Oekeshott, M. (1971) Education: the engagement and its frustration. *Journal of Philosophy of Education,* 5(1), pp. 43-76.

Oelkers, J. (2002) Rousseau and the image of "modern education". *Journal of Curriculum Studies*, 34(6), pp. 679-698.

Oelschlaeger, M. (1991) *The idea of wilderness: from prehistory to the age of ecology* (New Haven: Yale University Press).

Oelschlaeger, M. (1995) (Ed.) *Postmodern environmental ethics* (Albany: State University of New York Press).

Ong, W. J. (1969) World as view and world as event. *American Anthropologist*, New Series, 71(4), pp.634-647.

O'Riordan, T. (1989) The challenge for environmentalism. In R. Peet & N. Thrift (Eds) *New Models in Geography* (London: Unwin Hyman), pp. 77–102.

Parmenides of Elea (1996) *On nature*. Available online at: http://www.elea.org/Parmenides/ (accessed 4 March 2007).

Parent, W. A. (1976) Philo's confession. *The Philosophical Quarterly*, 26(102), pp. 63-68.

Perkins, D. (1998) Wordsworth and the polemic against hunting: "Hart-Leap Well". *Nineteenth-Century Literature*, 52(4), pp. 421-445.

Pittendrigh, C. S. (1958) Adaptation, natural selection and behaviour. In A. Roe & G. G. Simpson (Eds.) *Behaviour and Evolution* (New Haven: Yale University Press), pp. 394-416.

Plato (1955) *The Republic* (London: Penguin Books).

Plato (1965) *Timaeus and Critias* (London: Penguin Books).

Plumwood, V. (1993) *Feminism and the master of nature* (London: Routledge).

Popper, K. (1963a) Kirk on Heraclitus and on fire as the cause of balance. *Mind, New Series*, 72(287), pp. 386-392.

Popper, K. (1963b) *Conjectures and refutations: the growth of scientific knowledge* (London: Routledge & Kegan Paul).

Postma, W. W. (2004) *Because we are human*: *a philosophical inquiry into discourses of environmental education from the perspective of sustainable development and man's caring responsibility.* (Dissertation, Radboud University, Nijmegen).

Prigogine, I. & I. Stengers (1985) *Order out of chaos: man's new dialogue with nature* (London: Flamingo).

Purser, R. E., Park, C. & Montuori, A. (1995) Limits to anthropocentrism: toward an ecocentric organization paradigm? *The Academy of Management Review* 20(4), pp. 1053-1089.

Quarfood, M. (2006) Kant on biological teleology: towards a two-level interpretation. *Studies in History and Philosophy of Biological and Biomedical Sciences* 37, pp. 735-747.

Quennell, P. (1970) *Romantic England* (New York: MacMillan Company).

Rainsford, D. (2003) solitary walkers, encountering blocks: epistemology and ethics in Romanticism and Land Art. *European Journal of English Studies*, 7(2), pp. 177-192.

Reck, A. J. (1958) Substance, process, and nature. *The Journal of Philosophy*, 55(18), pp. 762-772.

Rees, D. A. (1954) Greek views of nature and mind. *Philosophy*, 29(109), pp. 99-111.

Regan, T. (1983) *The case for animal rights* (Berkeley: University of California Press).

Roberts, N. & Gifford, T. (1998) The idea of nature in English poetry. In P. D. Murphy (Ed.) *Literature of nature: an international sourcebook* (Chicago: Fitzroy Dearborn Publishers), pp. 166-176.

Robinson, T. M. (1967) Demiurge and world soul in Plato's Politicus. *The American Journal of Philology*, 88(1), pp. 57-66.

Rolston, H. (1989a) *Philosophy gone wild* (New York: Buffalo).

Rolston, H. (1989b) *Environmental ethics: duties to and values in the natural world* (Indiana: Temple University Press).

Rorty, R. (1980) *Philosophy and the mirror of nature* (Oxford: Basil Blackwell).

Rorty, R. (1989) Contingency, irony, and solidarity (Cambridge: Cambridge University Press).

Rorty, R. (1993a) Feminism, ideology, and deconstruction: a pragmatist view. *Hypatia* 8(2). Available online at: http://www.scholars.nus.sg/cpace/cspace/schwartz/philosophies.html (accessed 24April 2007).

Rorty, R. (1993b). Human rights, rationality, and sentimentality. In S. Shute & S. Hurley (Eds.) *On human rights: The Oxford Amnesty lectures 1993*. (New York: BasicBooks), pp.111-134.

Rosenblueth, A., Wiener, N. & Bigelow, J. (1943) Behavior, purpose and teleology. *Philosophy of Science*, 10(1), pp. 18-24.

Rousseau, J-J. (1962) *Emile*. Available online at: http://projects.ilt.columbia.edu/pedagogies/rousseau/ (accessed 15 June 2007).

Rousseau, J-J. (1973) *The social contract and discourses* (London: David Campbell Publishers).

Sacks, O. (1993) To see and not see, *The New Yorker*, May 10 1993. Available online at: http://www.wfu.edu/art/art111/files/12_tosee.pdf (accessed 15 June 2007).

Scheffler, I. (1959) Thoughts on teleology. *The British Journal for the Philosophy of Science* 9(36), pp. 265-284.

Schenk, H. G. (1966) *The mind of the European Romantics* (Oxford: Oxford University Press).

Schick, T. (1965) Check and spur: Parmenides' concept of (what) is. *The Classical Journal*, 60(4), pp. 170-173.

Schütz, A. (1962) *Collected papers, Vol. I: The problem of social reality*, (The Hague: Martinus Nijhoff).

Scribner, R. w. (1993) The reformation, popular magic, and the "disenchantment of the world". *Journal of Interdisciplinary History*, 23(3), pp. 475-494.

Sessions, G. (1995) Ecocentrism and the anthropocentric detour. In G. Sessions (Ed.) *Deep ecology in the twenty-first century* (Boston: Shambala), pp. 156-183.

Shelley, P. B. (1994) *The complete poems of Percy Bysshe Shelley* (New York: The Modern Library).

Shong, T-S (2000) *A comparative study on the basic competency for compulsory education between Australia and Taiwan*. Master Dissertation (Nantou: National Chi Nan University).

Singer, P. (1975) *Animal liberation* (New York: A New York Review Book).

Smith, N. K. (1947) Introduction. In D. Hume, *Dialogues concerning natural religion* (Indianapolis: Bobbs-Merrill), pp. 1-123.

Smith,W. Butler-Kisber, L., LaRocque, L., Portelli, J., Shields, C., Sparkes, C., and Vibert, A. (1998) *Student engagement in learning and life: national project report.* (Montreal: Office of Research on Educational Policy, McGill University).

Soper, K. (1995) *What is nature? culture, politics and the non-human* (Oxford: Blackwell)

Soper, K. (1996) Nature/nature. In G. Roberston, M. Marsh, L. Tickner, J. Bird, B. Curtis & T. Putnam (Eds.) *FutureNatural: nature, science, culture* (London: Routledge), pp. 22-34.

Soulé, M. E. & Lease, G. (1995) Preface. In Michael E. Soulé & Gary Lease (Eds.) *Reinventing nature: responses to postmodern deconstruction* (Washington: Island Press), pp. xv-xvii.

Spretnak, C. (1997) *The Resurgence of the real* (London: Routledge).

Stables, A. (1996) Paradox in compound educational policy slogans: evaluating equal opportunities in subject choice, *British Journal of Educational studies,* 44(2), pp. 159-167.

Stables, A. (1997) The landscape and the "Death of the author", *Canadian Journal of Environmental Education,* 2, pp.104-113.

Stables, A. (2001) Language and meaning in environmental education: an overview. *Environmental Education Research,* 7(2), pp. 121-128.

Stables, A. (2007) Is nature immaterial? The possibilities for environmental education without an environment. *Canadian Journal of Environmental Education,* 12, pp. 55-67.

Stables, A. & Scott, W. (2001) Post-humanist liberal pragmatism? environmental education out of modernity, *Journal of Philosophy of Education,* 35(2), pp. 269-279.

Steele, F. (1981) *The sense of place* (MA: CBI Publishing).

Stevenson, R. B. (2006) Tensions and transitions in policy discourse: recontextualising a decontextualised EE/ESD debate. *Environmental Education Research,* 12(3-4), pp. 277-290.

Stevenson, R. B. (2007) Schooling and environmental education: contradictions in purpose and practice. *Environmental Education Research,* 13(2), pp. 139-153.

Stoller, S. (2000) Reflections on Merleau-Ponty's scepticism, *Hapatia,* 15(1), 175-182.

Stone, A. (2005) Friedrich Schlegel, Romanticism, and the re-enchantment of nature. *Inquiry: An Interdisciplinary Journal of Philosophy,* 48(1), pp. 3-25.

Stratton, G. M. (1897a) Upright vision and the retinal image. *The Psychological Review* 4(2), pp. 182-187.

Stratton, G. M. (1897b) Vision without inversion of the retinal image (I). *The Psychological Review*, 4(4), pp. 341-360.

Stratton, G. M. (1897c) Vision without inversion of the retinal image (II). *The Psychological Review*, 4(5), pp. 463-481.

Stratton, G. M. (1899) The spatial harmony of touch and sight. *Mind: New Series* 8(32), pp. 492-505.

Ströker, E. (1997) Science and lifeworld: a problem of cultural change. *Human Studies,* 20, pp. 303-314.

Su, B. (1986) *The origins and continuing development of the Taiwanese society and people* (Washington: The Taiwanese Cultural Grassroots Association).

Su, Y-C. (2007) Ideological representations of Taiwan's history: an analysis of elementary social studies textbooks, 1978-1995. *Curriculum Inquiry*, 37(3), pp. 205-237.

Taylor, R. (1950) Comments on a mechanistic conception of purposefulness. *Philosophy of Science*, 17(4), pp. 310-317.

Tomas, V. (1958) Creativity in art. *The Philosophical Review,* 67(1), pp. 1-15.

Travers, M. (1998) *An introduction to modern European literature: from Romanticism to Postmodernism* (London: MacMillan Press).

Tsai, C-T. (2002) Chinese-ization and the nationalistic curriculum reform in Taiwan, *Journal of Education Policy*, 17(2), pp. 229-243.

Tuan, Y-F. (1975) Place: an experiential perspective, *Geographical Review,* 65(2), pp.151-165.

Tuan, Y-F. (1977) *Space and place: the perspective of experience* (Minneapolis: University of Minnesota Press).

Tuan, Y-F. (1986) Strangers and strangeness, *Geogaphical Review,* 76(1), pp. 10-19.

UNESCO (1972) *The Stockholm Declaration* (Gland: UNESCO).

UNESCO-UNEP (1977) *Tblisi Declaration* (Moscow: UNESCO-UNEP)

Van Koppen, C. S. A. (Kris) (2000) Resource, arcadia, lifeworld: nature concepts in environmental sociology. *Sociologia Ruralis,* 40(3), pp. 300-318.

Van Manen, M. (1997) *Researching lived experience: human science for an action sensitive pedagogy* (Ontario: The Althouse Press).

Warren, K. (1995) The power and promise of ecological feminism, in: James P. Sterba (Ed.) *Earth ethics: environmental ethics, animal rights, and practical application* (New Jersey: Prentice-Hall Inc.), pp. 231-241.

Waters, M. (1995) *Globalization* (London: Routledge).

WCED (1987) *Our common future* (Oxford: Oxford University Press).

Weber, M. (1948) Science as a vocation. In H. H. Gerth and C. Wright Mills (Eds.) *From Max Weber: essays in sociology* (London: Routledge & Kegan Paul LTD), pp. 129-156.

Weller, R. P. (2006) *Discovering nature: globalization and environmental culture in China and Taiwan* (Cambridge: Cambridge University Press).

Weston, A. (1991) Non-anthropocentrism in a thoroughly anthropocentrised world. *The Trumpeter* 8(3). Available online at: http://trumpeter.athabascau.ca/index.php/trumpet/article/view/459/761 (accessed 18 May 2008).

Weston, A. (1996) Beyond intrinsic value: pragmatism in environmental ethics. In A. Light & E. Katz (Eds.) *Environmental pragmatism* (London: Routledge), pp. 285-306.

White, L. J. (1967) The historical roots of ecologic crisis. *Science, New Series* 155(3767), pp. 1203-1207.

Whitehead, A. N. (1962) *The aims of education* (London: Ernest Benn Limited).

Whitehead, A. N. (1979) *Process and reality: an essay in cosmology* (London: Collier Macmillan).

Williams, R. (1973) *The country and the city* (New York: Oxford University Press).

Williams, R. (1980) *Problems in materialism and culture* (London: Verso).

William, R. (1993) *The country and the city* (London: Hogarth).

Wordsworth, W. (1888) *The completed poetical works* (London: Macmillan and Co.) available online at: http://www.barletby.com/145/ (accessed 13 August 2007).

Wordsworth, W. (1984) *William Wordsworth: the major works* (New York: Oxford University Press).

Zeyl, D. (2005) *Plato's Timaeus*. In Edward N. Zalta (Ed.), available online at: http://plato.stanford.edu/entries/plato-timaeus/ (accessed 11 May 2008).

Zimmerman, M. E. (1983) Toward a Heideggerian ethos for radical environmentalism, *Environmental Ethics,* 5, pp. 99-131.

Zimmerman, M. E. (1986) Implications of Heidegger's thought for deep ecology, *The Modern Schoolman,* LXIV, pp. 19-43.

Zimmerman, M. E, (1993) Rethinking the Heidegger-deep ecology relationship, *Environmental Ethics,* 15 (3), pp. 195-224.

Zimmerman, M. E. (1994) Contesting Earth's Future: Radical Ecology and Postmodernity (Berkeley: University of California Press).

Zuckert, C. (1991) The politics of Derridean deconstruction. *Polity,* XXIII (3), pp. 335-356.